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AMERICAN PUBLISHER'S NOTICE.

THIS work, although based upon Chambers's Encyclopædia, whose distinguished merit is widely known, differs from it in important respects. It could scarcely be expected that an Encyclopædia, edited and published for a foreign market, would give as much prominence to American topics as American readers might desire. To supply these and other deficiencies the American Editors have inserted about 15,000 titles, arranging the whole, including Chambers's Supplement, in a single alphabet. The total number of titles is now about 40,000. The additions give greater fullness in the departments of biography, geography, history, natural history, and general and applied science. Scrupulous care has been taken not to mutilate or modify the original text of the edition of 1880; no changes have been made except such verbal alterations as are required by the omission of the wood-cuts. The titles of articles from Chambers's Encyclopædia, either from the main work or from the Supplement, are printed in bold-faced type—**AMERICA.** The titles of the American additions, whether of new topics or of enlargements of the old, are printed in plain capitals—AMERICA. Should it appear that an article from the English work and its American continuation disagree in any points, the reader will readily refer the conflicting statements to their proper sources.

The labor of consultation will be much reduced by the catch-words in bold-faced type at the top of the page, being the first and last titles of the pages which face each other; and by the full title-words on the back of the volume, being the first and last titles contained therein.

The word *ante* refers to Chambers's Encyclopædia, as represented in this issue. Whenever the word (*ante*) follows a title in the American additions, it indicates that the article is an enlargement of one under the same title in Chambers's Encyclopædia—usually to be found immediately preceding.

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GRANDEE'S (Span. *grandes*), the name by which the most highly privileged class of the nobility of the kingdom of Castile has been known since the 13th century. To this class belonged the whole of that very powerful portion of the nobility who, from their wealth, were called the *Ricos Hombres* by pre-eminence; and to whom, moreover, the crown had granted the right of bearing a banner, and of gathering mercenaries around it on their own account. The members of the royal family were as such included amongst the grandees. The honors of the grandees were hereditary; they held lands from the crown on the tenure of military service, being bound to produce a certain number of lances, each lance being represented by a knight with four or five men-at-arms. The grandees were exempted from taxation, and could not be summoned before any civil or criminal judge without a special warrant from the king. They were entitled to leave the kingdom, and even to enter the service of a foreign prince at war with Castile without incurring the penalties of treason. Besides these privileges, which were common to them with the rest of the higher nobility, the grandees possessed several which were peculiar to themselves, or which they shared only with the so-called "Titulados"—the counts and dukes. Of these must especially be mentioned the right in all public transactions of being covered in the presence of the king. The king addressed a grandee as *mi primo*, "my cousin-german;" whereas any other member of the higher nobility he called only *mi pariente*, "my relative." In the national assemblies, the grandees sat immediately after the prelates and before the titled nobility (titulados). They had free entrance into the palace, and into the private chambers of the monarch; and on the occasion of religious solemnities, they had their place in the chapel royal next to the altar. Their wives shared their dignities, the queen rising from her seat to greet them. Under Ferdinand and Isabella, cardinal Ximenes succeeded in breaking the power of the feudal nobility so completely, that by the end of the 15th c. the privileges both of the grandees and of the rest of the higher nobility were almost wholly abolished. Ferdinand's successor, Charles V., who considered it still necessary to bind to his party some of the nobles, and to reward others for the important services which they had rendered him, contrived out of an independent feudal nobility to construct a dependent court nobility. Gradually three classes of grandees arose out of this merely nominal nobility. It was the privilege of the first class to be commanded by the monarch to be covered before they had begun to address him; the second class received this command as soon as they had finished their address, and heard the king's reply with covered head; but to the third class it was addressed only after they had already listened uncovered to the royal reply. All grandees had the title *excellency*, and sentries were bound to present arms to them. By the revolution and under the government of Joseph Bonaparte, the dignities and privileges of the grandees were entirely abolished; but they were partially restored at the subsequent restoration, though no very important privileges were bestowed on them. According to the constitution of 1875, grandees are members of the senate or upper house in their own right.

GRANDFATHER. A grandfather is not liable at common law in England to maintain grandchildren; but if they are destitute, and are relieved by the parish, the parish may, under the statue 43 Eliz. c. 2, call upon him, if able, to contribute to their support. In Scotland, the liability exists at common law, and is enforceable without the aid of a statute if the father, who is primarily liable, is unable to maintain the children.

GRANDE RONDE, THE, a valley in Oregon, in Union co., near the n.e. corner of the state drained by the river of the same name, and bounded on the w. by the Blue mountains. In the valley are about 430 sq.m. of fertile land, and abundance of timber is found in the surrounding hills.

GRAND FORKS, a co. in n.e. Dakotah, w. of the Red river of the n., organized after the census of 1870, about 2,270 sq.m.; surface is nearly all prairie, and timber is scarce. The region is very little settled. Co. seat, Grand Forks.

GRAND HAVEN, a small but rapidly increasing t. in the state of Michigan, U.S., is situated on the eastern shore of lake Michigan, at the mouth of Grand river, and forms

the western terminus of the Detroit and Milwaukee railroad, which has here a most extensive depot and pier 3,000 ft. long extending into the lake. It has a spacious and excellent harbor, with a depth of from 30 to 50 feet. It exports timber, fish, leather, gypsum, stucco lime, and flour. The exports have already, in some years, exceeded one million dollars in value. Pop. '70, 3,700.

GRAND HAVEN (*ante*), a city and seat of justice of Ottawa co., Mich., on Grand river, where it falls into lake Michigan; 112 m. n.e. of Chicago, on the Michigan lake shore, and the Detroit and Milwaukee railroads; pop. 4,363. It has a good harbor, a court-house, about a dozen churches, many lumber mills and other manufactories. A magnetic spring is much visited in the summer season.

GRAND ISLE, the n.w. co. of Vermont, bordering on Canada and on lake Champlain, intersected by the Vermont central railroad; 80 sq.m.; pop. '80, 4,124. Within the territory are several small islands in the lake. The surface of the co. is uneven, and the soil fertile; productions, oats, hay, wool, and butter. Co. seat, North Hero.

GRAND JURY is the assembly of good and sufficient men, summoned by order of the sheriff to attend every sessions of the peace, and every commission of oyer and terminer and general jail delivery in England, for the purpose of inquiring into the charges for offenses, and of returning to the court their delivery thereon. The institution of the grand jury dates back to the earliest period of English history, having been in use among the Saxons. By a law of Ethelred it is enacted, "Exeant seniores duodecim thani, et præfectus cum eis, et jurent super sanctuarium quod eis in manus datur, quod nolint ullum innocentem accusare, nec aliquem noxium cælare."—Wilkins, *Leges. Ang. Sax.* 117. From this enactment, it appears that the number of the grand jury was originally twelve; but we learn from Bracton that, in the time of Henry III., it was the practice to return four knights for every hundred, who elected twelve other knights, or else twelve *liberos et legales homines*, to take part with them in the inquest. Towards the latter part of the reign of Edward III., in addition to the inquest for the hundred, the sheriff was required to return a panel of knights for the whole county. This jury was called *le graunde inquest*, and made inquiry for the county, while the jury for the hundred inquired for its own district only. After the establishment of the *graunde inquest*, the practice of summoning a jury of the hundred gradually went out of use; but until 6 Geo. IV. c. 50, it was deemed necessary that some of the grand jury should be summoned for every hundred. In the present day, the grand jury must consist of not less than twelve, or more than twenty-three members. A grand jury is summoned for every assize, and for the quarter-sessions in counties and burghs. It is not necessary that grand jurors should be freeholders; they may be leaseholders or ratepayers, but often are gentleman of wealth. The qualification of grand jurors is fixed by 6 Geo. IV. c. 50, and is the same as that of the petit jury. See JURY TRIAL. Town-councilors of a burgh are exempt from serving on juries within the burgh. An Irish peer, who is a member of parliament, is liable to serve on the grand jury at assizes. An alien cannot serve on the grand jury unless he has been naturalized. In Middlesex two grand juries were summoned every term, and sworn before the senior judge of the queen's bench, but this is discontinued unless on special occasions. After having the oath administered, and receiving a charge from the judge, they retire to their room, and the various indictments, which are called bills, are laid before them. The duty of the grand jury is simply to inquire whether there is sufficient *prima facie* evidence to require a trial. For this purpose, they may require the same evidence, written and parol, as may be necessary to support the indictment at the trial. But in practice, having ascertained that the crown has a sufficient *prima facie* case, they return a true bill, the prisoner's evidence being reserved for the trial. Witnesses are sworn on their examination before the grand jury by an officer appointed by the court. When the jury have come to a conclusion, the clerk indorses on the indictment *a true bill* in case the jury, or a majority of twelve, are satisfied that the case is sufficiently strong. In case they are not satisfied, the indictment is indorsed *not a true bill*. The foreman, accompanied by one or more of the jurors, then carries the indictments into court, and presents them to the clerk, who states to the court the nature of the charge and the indorsement of the jury. A bill having been thrown out by the grand jury, it cannot be preferred to the same grand jury during the same assizes or sessions. The grand jury usually serve for the whole session to which they are summoned; but in an emergency, as where a serious crime has been committed, and the prisoner brought in after the jury has been discharged, it is competent to swear a new jury. It frequently happens at assizes that, an offense having been committed before the grand jury have been discharged, a bill is immediately sent before them, on which they make their return; so that the case is disposed of in a few days, or even a few hours, after commission of the offense.

Although the grand jury has often been complained of as a somewhat superfluous step in the prosecution of offenses, and as no longer required, yet it provides an additional safeguard to the liberty of the subject in all cases. It has, however, been proposed to abolish it when the case has been already before a magistrate, who has like duties to perform.

In Scotland there is no grand jury; the duty of investigating and bringing to trial in that country being assigned to a public prosecutor. See ADVOCATE, LORD.

GRAND JURY (*ante*), a body of men summoned by a sheriff whose function it is, upon such evidence as the attorney of the state may present, to determine whether persons accused of crime, shall be indicted and tried therefor, and to inquire into such other matters as may be confided to them by the court, or come to their knowledge. They do not examine witnesses for the defense, for it is not their duty to find a verdict, but only to decide if there is *prima facie* evidence of guilt, such as to warrant a trial. In all essential particulars this institution in the United States is the same as it is in England, but upon minor points, there are in practice some differences. The number of men required to constitute a grand jury is not the same in every state, but varies from 12 to 23. The court may in its discretion select the foreman or allow the jurymen to do so. The foreman first, and then the other members of the jury, take the following oath: "You do swear (or affirm) that you will diligently inquire, and true presentment make, of all such articles, matters and things as shall be given you in charge, or otherwise come to your knowledge, touching the present service; the commonwealth's counsel, your fellows, and your own, you shall keep secret; you shall present no one for envy, hatred, or malice; nor shall you leave any one unpresented for fear, favor, affection, hope of reward or gain; but shall present all things truly, as they come to your knowledge according to the best of your understanding." Having been sworn and received a charge from the court explanatory of their duties, they retire to their room. The foreman presides, and it is usual to appoint one of the members as secretary, to keep a record for their own exclusive use. Bills of indictment against offenders are then laid before them by the state's attorney, and on the backs of the same are written the names of the witnesses by whose testimony they are supported. The witnesses are examined under oath, and if their testimony is deemed sufficient in any case to establish a fair probability of guilt, the foreman writes on the back of the indictment, "A true bill," signs his name and affixes the date. If the evidence is not sufficient, he writes on the back of the indictment the words "Not a true bill," or other words meaning the same thing. To find a true bill 12 of the jury must concur. Witnesses misbehaving themselves must be reported to the court, which may commit them for contempt if the offense is sufficiently grave. The jury must attend until discharged by the court.

GRAND LAKE, a large but shallow body of water in Louisiana, emptying through a tortuous lagoon into Atchafalaya bay.

GRAND LAKE, sometimes called Schoodic lake, in Maine, on the border of New Brunswick, the greater part in Washington co. Its waters pass into St. Croix river.

GRAND MANAN, or MENAN, an island in the Atlantic off the Maine coast, belonging to New Brunswick and embraced in Charlotte co.; pop, '71, 1,867. It is about 20 by 5 m. with abundance of timber, and excellent facilities for ship building. Fishing is one of the leading occupations of the inhabitants.

GRAND MASTER (Lat. *magnus magister;* Ger. *Hochmeister*), the title of the head of the military orders, the hospitallers, the templars, and the Teutonic knights; see these articles. The title originally borne by the superior of the hospitallers was simply "master" (*magister*); but in 1268 Hugh de Reval took that by which they are since known—grand master, *magnus magister*. In the Teutonic order, the title "master," with different modifications, was applied to the several superiors of the order in the various countries. Thus, the superior of Germany was styled *teutsch-meister*, "German master." The superior of Livonia was called *heer-meister*, "military master." In all these orders the office of grand master was held for life. The name was also used in the Dominican order.

GRAND MONADNOCK, a mountain in Chelsea co., N. H., rising 3,718 feet. It is an isolated peak, and a conspicuous landmark, offering from the top a wide and picturesque view.

GRAND PENSIONARY. Formerly the syndic of each of the important towns of Holland was termed a pensionary, and the state-secretary for the province of Holland, a grand pensionary. Until the time of Olden Barneveldt (q.v.), the grand pensioner was also advocate-general for the same province. He had no vote in the assembly of the states, and could only bring forward the subjects of discussion. He, however, collected the votes, wrote the decrees, read the letters addressed to the states, conducted negotiations with foreign ambassadors and ministers, and took charge of the revenues of the province, of its rights and privileges, and whatever else pertained to its welfare. He was a perpetual member of the states-general of the United Netherlands, and thus, as first magistrate of the first of the united provinces, he acquired immense influence over all Holland, and may be considered premier of the Dutch parliament. The grand pensionary held his office for five years, but was in most cases re-elected. The office was abolished in 1795, after the conquest of Holland by the French revolutionists.

GRAND-PIERRE, JEAN HENRI, D.D., 1799-1874; b. Switzerland, educated in Neufchatel and Tübingen; became pastor at Bâle and was an intimate friend of Vinet. In 1827 he went to Paris and was president and professor of languages in the theological seminary, and was soon recognized as one of the most eloquent of pulpit orators. His last 20 years were passed as pastor of l'Oratoire, the greatest of Protestant churches in the French capital. After Monod's death he was leader of the orthodox branch of the

Reformed church. Louis Philippe granted him letters of naturalization, and Louis Napoleon made him a member of the legion of honor. In 1838 he was granted the degree of doctor of divinity by the college of New Jersey. He visited the United States twice, and in 1850 published *A Glance at America*. With his family he endured the siege of Paris (in the Franco-German war) and the horrors of the commune. Among his works are *Christian Doctrine; Christian Life; Unity and Variety; Sorrow and Consolation; Guide to Faith; Essay on the Pentateuch; Souvenirs of an Old Pastor*, etc.

GRAND PRÉ, a village in Nova Scotia, in Kings co., on the basin of Minas, reached by the Windsor and Annapolis railroad, 15 m. from Windsor; pop. about 600. It is notable chiefly as the central scene in Longfellow's pastoral poem *Evangeline*.

GRAND RAPIDS, a prosperous manufacturing city, in the state of Michigan, U. S., is situated in a pleasant and healthy district on both banks of the Grand river, about 33 m. from lake Michigan, and 60 m. n.w. of Lansing. The river is here about 900 ft. wide, and descends 18 ft. in the course of 1 m., producing abundant water-power. The town is handsomely built, commands a fine view, and is one of the most important trading and manufacturing cities in the state. The vicinity is rich in salt and gypsum, and in limestone, pine-lumber, and other building materials. Pop. '70, 18,157. The city was first settled in 1833, and incorporated in 1850.

GRAND RAPIDS (*ante*), a city and seat of justice in Kent co., Mich., on Grand river at the junction of seven railways, 158 m. w. of Detroit; pop. '74, 25,989. The river and canals on either shore furnish abundant water power, and there are many large manufactories of lumber, furniture, cooper's work, wooden ware, farming tools, iron, leather, flour, machinery, bricks, cement, plaster, chemicals, beer, etc. The plaster is got from gypsum deposits in the neighborhood. The city is tolerably well built, and is the center of an important trade. It has a fine court-house and post-office, churches, and public schools.

GRAND RIVER, a river of North America, rises and flows throughout its entire course, within the state of Michigan, and falls into the lake of that name at the town of Grand Haven (q.v.). Its source is in the s.e. of the state, in two branches which unite near the town of Jackson. Grand river is navigable for large steamers to the rapids, which are 40 m. from the mouth of the river, and for smaller boats for 50 m. further; its whole course is 270 miles.

GRAND RIVER, a tributary of the Colorado, rising in Middle Park, s. Dakotah, passes into Utah in a s.w. direction crossing the s.e. section of the territory, then into Arizona and after a course of about 390 m. unites with the San Juan to form the Colorado of the w., so famous for its wonderful cañons. There are some large cañons on Grand river also.

GRAND SERGEANTY (*magna serjeantia*, or *magnum servitium*, great service), was the most honorable of the ancient feudal tenures. According to Lyttleton, tenure by grand sergeanty is where a man holds his lands or tenements of our sovereign lord the king by such services as he ought to do in his proper person to the king, as to carry the banner of the king, or his lance, or to lead his army, or to be his marshal, or to carry his sword before him at his coronation, or his carver, or his butler, or to be one of his chamberlains of the receipt of his exchequer, or to do other like services. This tenure must have been held of the king. Where lands were held of a subject, on condition of performance of services identical with those which were rendered to the king, the tenure was not grand sergeanty, but knight's service. Thus, lands on the Scottish border held of the king by cornage—i.e., on condition of winding a horn to give notice when the Scots had crossed the border—were held in grand sergeanty; but lands held of a subject for the same service were held in knight's service. Tenants holding by grand sergeanty were free from escuage, which usually appertained to knight's service, and in general could only be called upon to perform their services *infra quatuor maria*, within the kingdom. The services in grand sergeanty were to be performed by the tenant in person, where he was able to do so. The office of attendance on the sovereign's person was esteemed so honorable, that no one below the dignity of a knight could perform it. Hence, where lands held by grand sergeanty were in the possession of a citizen, he was permitted to perform his service by deputy. This tenure by grand sergeanty was by 12 Charles II. c. 24, in common with other military tenures, reduced to common socage (q v.); except so far as regards the honorary services, which continue to be observed to this day. Thus, the duke of Wellington holds of the crown his estate of Strathfieldsaye on condition of presenting to the sovereign a flag bearing the national colors on each succeeding anniversary of the battle of Waterloo. The manor of Woodstock, with the demesne, in which is situated Blenheim park, is held by the duke of Marlborough by grand sergeanty, on condition of presenting to the queen and her heirs, at the castle of Windsor, a standard of France, on Aug. 13, yearly, being the anniversary of the day on which the battle of Hochstädt was fought near the village of Blenheim, on the banks of the Danube. The tenure of grand sergeantry was observed throughout the continent of Europe. "The freeborn Franks," says Mr. Hallam, *Middle Ages*, "saw nothing menial in the titles of cupbearer, steward, marshal, or master of the horse, which are still borne by the noblest families in every country in Europe, and by sove-

reign princes in the empire. The count of Anjou, under Louis VI., claimed the office of great seneschel of France—i.e., to carry dishes to the king's table on state-days. Thus, the feudal notions of grand sergeanty prepared the way for the restoration of royal supremacy, as the military tenures had impaired it."

In Scotland, grand sergeanty was not known as a separate tenure—that is to say, lands held on condition of honorary services rendered to the sovereign were not attended with any privileges other than those attaching to lands held in a similar manner of a subject superior. In that country a tenure by honorary service was known as a BLANCH HOLDING.

GRAND TRAVERSE, a co. on Grand Traverse bay in n.w. Michigan, 500 sq.m.; pop. '74, 5,349. The surface embraces a number of lakes and large areas of timber, among which are sugar-maple and white pine. The main article of export is lumber. Co. seat, Traverse city. Grand Traverse bay, is an offshoot of lake Michigan extending s. 30 m. by 12 m. wide. Grand Traverse river, rises in Kalamazoo co., and after a short course w. and n. empties into the bay of the same name.

GRANDVILLE, JEAN IGNACE ISIDORE GÉRARD, a French artist and caricaturist, was b. at Nancy, Sept. 3, 1803. In the year 1828 he published the first of a series of humorous sketches, entitled *Les Métamorphoses du Jour*, which were highly thought of; and soon afterwards another series, entitled *Les Animaux Parlants*. After the July revolution Grandville, with Decamps and Daumier, became the moving spirit of the "caricatures," perfect collections of which are now in great request. His *Convoi de la Liberté*, his *Basse Cour, Mat de Cocagne*, etc., as pictures of the politics and manners of the times, are of great and lasting value. When the law of Sept. put an end to political caricature, Grandville used his pencil to satirize the less important follies and vices of mankind. He also contributed illustrations to new and splendid editions of the *Fables* of Lafontaine and Florian, the *Adventures of Robinson Crusoe, Gulliver's Travels*, Abel Hugo's *Vie de Napoleon*, Raybaud's *Jérôme Paturot*, etc. Grandville is remarkable for depth and delicacy of observation and criticism, for his ingenious turn of thought, and accuracy in portraiture. His drawing is correct, his anatomy accurate, his foreshortening carefully studied; the whole is occasionally hard and cold, the idea complicated, but always united with rare delicacy of allusion and affluence of symbolical details. Grandville died in 1847.

GRANE, GRAN, or QUADE, a t. and seaport of Arabia, is situated on a bay of the same name at the north-western extremity of the gulf of Persia, in lat. 29° 26' n., long. about 48° east. Its trade is of some importance. Pop. estimated at about 8,000.

GRANGE, a word which primarily means a granary or storehouse for grain, but which has been broadly used as signifying an estate with all the buildings thereon; used in the United States since 1867, as the familiar name of the state and subordinate organizations of the "patrons of husbandry," a national association of agriculturists, of which Mr. O. H. Kelley, a native of Boston, is the reputed founder. The society originated in the depressed condition of agriculture following the war of the rebellion, and was especially designed to redress the grievances of farmers at the west on account of the alleged injustice of the railroad companies in their charges for carrying agricultural freight, and on account of the exorbitant prices paid to middlemen for handling such freight and for supplying agricultural implements and stores. The plan of the organization, which is somewhat like that of the odd-fellows, was formed by Mr. Kelley and Mr. William Saunders, who were connected with the department of agriculture in Washington, and was designed to bring the farmers of the country into active co-operation for mutual protection. The plan embraced a common ritual, with secret ceremonies of initiation, to be observed by the local associations, which are subordinate to the national body. Each grange elects its own officers, women being admitted to membership equally with men, but no one of either sex being eligible unless interested in agricultural pursuits. The national and state granges meet annually, the local ones monthly or oftener. The order has its greatest strength in the north-western states. In 1875 the total number of granges was estimated at 30,000, with a membership of nearly 2,500,000. In 1874 the national grangers issued a manifesto declaring the objects of the order to be "to develop a better and higher manhood and womanhood among ourselves; to enhance the comforts and attractions of our homes; to buy less and produce more, in order to make our farms self-sustaining; to discountenance the credit system, the mortgage system, the fashion system, and every other system tending to prodigality and bankruptcy; to secure harmony, good-will, and vital brotherhood among ourselves, and to make our order perpetual." The order is social and economic, and neither political nor sectarian. Through the influence of its members, laws were passed in Illinois and Wisconsin putting railroad companies under sharp restrictions as to their charges for carrying agricultural products; but some of these laws were declared to be unconstitutional by the courts, and the order has accomplished far more by moral and social influence than by legislation. The benefits conferred by it upon the agricultural community are believed to be very great. The system of co-operation which it has fostered has assisted not a few farmers in their efforts to get out of debt, and developed a spirit of enterprise and co-operation which is of inestimable value. But, notwithstanding this, the order is understood to have declined in the last few years. Whether

this is because it is somewhat overweighted with its own machinery of organization, or because other objects have, for the time being, absorbed the attention of its members, is not here affirmed. Certainly there is no diminution of the popular interest in agriculture, and it is believed that farmers as a class are as keenly alive to their interests now as at any previous time.

GRANGER, FRANCIS, 1792–1868; son of Gideon, b. Connecticut. He removed in early life to western New York and practiced law. He was a member of the assembly and a prominent leader in the anti-masonic movement; became a leader in the whig party and a member of congress, and in 1841 was appointed postmaster-general. His last appearance in political life was as one of the leaders of the small section known as "silver gray" whigs, who opposed the drift of the party toward active opposition to slavery.

GRANGER, GIDEON, 1767–1822; b. Conn.; graduated at Yale, and admitted to the bar in 1788. He was for several years a member of the legislature, and conspicuous in efforts to promote education by establishing a school fund. In 1801 he was made postmaster-general, holding the office until 1814. In New York he was state senator, and a warm supporter of De Witt Clinton's plans for internal improvement.

GRANGER, GORDON, 1821–76; b. New York; a graduate of West Point; was transferred to the mounted rifles in 1846; was in the siege of Vera Cruz, and the battles of Cerro Gordo, Contreras, and the capture of Mexico. In 1861 he was a capt. of cavalry. In the war of the rebellion he served with distinction in several battles, and in 1862 became maj.gen. of volunteers. He was in the battle of Chickamauga, at Missionary ridge, and the siege of fort Morgan and capture of Mobile; subsequently he was department commander in Texas and Kentucky. In 1866 he was made col. of infantry.

GRANGER, ROBERT S., b. Ohio, 1816; graduate of West Point; served in the Florida Indian war; was tutor at the military academy; for many years on the frontier; in the war of the rebellion, col. of Kentucky volunteers (union), and participated in many skirmishes and battles. In 1871 he was appointed col. of infantry, and two years afterwards was placed upon the retired list.

GRANI'CUS, the ancient name of a small river in the n.w. of Asia Minor, flowing from the northern side of mount Ida to the Propontis, and now known as the Kodsha-su. The Granicus is celebrated as the scene of the first victory gained by Alexander the great over the Persians after he crossed the Hellespont, 334 B.C.

GRANIER DE CASSAGNAC, BERNARD ADOLPHE, a name well known among Parisian journalists, and not unknown in the Palais de Justice, was born at Averon-Bergelle (dep. Gers), in 1808. He was educated at the college of Toulouse, and contributed for a short time to the southern press, but soon quitted the provinces for Paris, where Victor Hugo introduced him to the *Journal des Débats*, and *Revue de Paris*. Here his vehement style did not give satisfaction, and he was engaged by M. Girardin to write literary criticisms for *La Presse*. In 1840 he sailed for the Antilles, in hopes of political advancement, ingratiated himself with the planters, although he narrowly escaped being murdered by the blacks, married a Creole lady, Mademoiselle Beauvallon, and returned to Paris as deputy for Guadeloupe. Not being able to arrange a satisfactory engagement with *La Presse*, he founded the *Globe*, ultra-Orleanist, and violent to such a degree that the opposition journals agreed to ignore it (*la conspiration du silence*, as it was called). The *Globe* failed; and in 1845 Granier de Cassagnac started *L'Epoque*, also violent, and also a failure. It was merged in the *Presse*, not, however, before its editor had been openly accused in the chamber of deputies of selling his influence with the government. Shortly before the revolution, he was employed by M. Guizot to set up a ministerial paper at Rome. In 1848 he returned to France, and after a while reappeared in Paris, as an ardent supporter of the prince president, and a bitter foe to his old patrons, the house of Orleans. He edited the *Pouvoir* (1850), and wrote for the *Constitutionnel* with an excess of zeal and a pretense of exclusive information which led to an *avertissement*. In 1852 he was elected as the government candidate for Mirande (Gers), for which he was re-elected in 1857 and 1863. In the chamber, he spoke in favor of the army dotation bill, advocated direct taxation on all descriptions of funded property, additional protection for the interests of literature, and the formation of a local railway in his department. In 1857 he was made grand officer, and in 1865 commander of the legion of honor. In 1867 he founded *Le Réveil*, a weekly religious organ, which died the next year. He afterwards became principal editor of the semi-official *Pays*, and in 1863 was manager of the *Nation*. In 1870 on the fall of the empire, he retired to Brussels; in 1876 he was elected a member of the national assembly. The appearance of Granier de Cassagnac before the courts of justice have been very numerous. In 1842 he was tried for a duel with M. Lacrosse, of whose father he had written disrespectfully, and whom he lamed for life. In 1845 he prosecuted M. Hilbey for libel in his pamphlet on the *Venality of the Press*. In 1847 he was mixed up in the duel in which his brother-in-law, Beauvallon, killed Dujarrier of *La Presse*, and about which strange things were said. He was also sued by Delasalle for a debt which he declared he had paid. M. Delasalle gained his cause. In 1855 his publisher pro-

ceeded against him for non-delivery of a MS. on the eastern war. The duel between Paul de Cassagnac of the *Pays* and a writer in the *Soleil* (in which Granier de Cassagnac seconded his son), and the unseemly quarrel between the Cassagnacs and M. Vermoul of the *Courrier Français*, were matters of great notoriety. His most important works are: *A Voyage to the Antilles* (1844); *The Queen of the Prairies*, a romance (1845); *The Causes of the French Revolution of* 1789 (1850); *The History of the Directory*, a reprint from the *Constitutionnel* (1851–56); *The Fall of Louis Phillippe* (1857); *The Girondins and the Massacres of September* (1860), etc. All his writings are remarkable for vigor of style, but the thorough-going partisanship of the author greatly impairs their historical value.

GRANIER DE CASSAGNAC, Paul, b. 1840 or '41. He began when quite young to write for newspapers, and soon became noted for the fierceness of his personal attacks on his contemporaries and the duels to which such attacks often led. In 1866, under the patronage of his father, he joined the editorial staff of *Le Pays*, an influential journal of Paris, and not long after became the principal editor. From that period to the present he has pursued a course so aggressive as to be in an almost continuous series of quarrels, particularly with editors and writers of the anti-Bonapartist side. One of his several encounters was with Gustave Flourens in 1869. In 1868 Louis Napoleon gave Cassagnac the decoration of the legion of honor, and the next year he became member of the general council for Gers. In the German war he served as a volunteer in the zouaves, was captured at Sedan, and kept a prisoner in Silesia for eight months. When free he resided for a time in Vienna, then went to Gers and established *L'Appel au Peuple*, a violent political journal. In 1872 he resumed his chair as editor of *Le Pays*, but within a brief period he was again in a duel (with M. Lockroy), for which he got a week's imprisonment and a fine of 100 francs. In 1873 he fought M. Ranc, a journalist, when Ranc was disabled and Cassagnac was slightly wounded. In 1874 he was tried for printing articles calculated to disturb the peace, on which occasion he conducted his defense in person and was acquitted, an event looked upon by the imperialists as a signal triumph. In 1874 he violently criticised gen. Wimpffen for the surrender of Sedan. The officer prosecuted for libel, but the editor was acquitted. In 1876 and 1877 he was returned to the national assembly for Gers.

GRANITE, a well known igneous rock, composed of the three minerals, quartz, feldspar, and mica, united in a confused crystallization; that is, without a regular arrangement of the crystals. The feldspar is the most abundant ingredient, and the proportion of quartz is greater than that of mica. The name has been given to it on account of its granular structure.

Granite differs from greenstone and the later igneous rocks, in the large quantity of quartz that enters into its composition. In the trappean and other igneous rocks, the silica or silicic acid is only sufficient for union with the bases to form feldspar and horablende, the constituents of these rocks, none remained free to crystallize as pure quartz; while in granite, so great is the excess of silex, that in its pure state, as quartz, it forms a considerable bulk of the rock. Granite is always a compact rock, it never passes into or alternates with tuffs or breccias. This peculiarity, associated with the crystalliae structure of the rock, and the absence of cellular cavities, such as are produced in trappean and volcanic rocks by the expansion of the contained gases, have led to the belief that granite has been formed at considerable depths in the earth, and has crystallized slowly under great pressure either from superimposed strata or deep seas. On this account the granitic rocks have been called "Plutonic rocks;" and Lyell has applied to them the term "hypogene," from *upo*, under, and *ginomai*, to be born. It was formerly supposed that all granitic rocks were formed before the deposition of any of the sedimentary strata, and hence they are named "Primitive rocks." But it having been found that granite is associated with formations of various ages, and that even since the beginning of the tertiary epoch its intrusion among the eocene strata of central Europe has raised the Alps more than 10,000 ft. above the level of the sea, this name has been entirely dropped. Although granite is not absent from the secondary or tertiary strata, it is more frequently associated with the palæozoic formations; indeed, it appears to be the fundamental rock of the earth's crust. Wherever we reach the base of the stratified rocks, we find them resting upon granite; and whatever the age of the strata thus lying on this igneous rock, we have no reason to suppose that below the granite there occur beds of older date, for, although granite penetrates the stratified rocks, it has not been noticed to spread over them like greenstone, so that wherever it presents itself in a large mass, it is believed that no other rock is beneath it. Some granites, however, occur interstratified with undoubted sedimentary rocks, and it is argued that, as the transition from these sedimentary rocks to the crystalline granite can be traced by gradual stages through mica schist and gneiss, the granite is only the final stage of these metamorphic changes. Many of the granites of Scotland are accordingly believed to be older palæozoic sediments greatly altered. It is not maintained that all granites have such an origin; but no lithological character has yet been observed whereby the igneous granite can be distinguished from that produced by metamorphic action.

Large extents of the earth's surface are covered with granites; occasionally, it is the superficial rock in flat undulating plains, but it most frequently makes its appearance

in mountainous regions. It seems probable that sometimes igneous granite has been raised from below as a solid indurated rock; it has, however, generally been in a fluid condition, as is evidenced by the number of veins which are protruded from it into the adjacent rocks.

The varieties of granite depend upon the number and quantity of its mineral constituents, and upon the state of aggregation of these materials. Ordinary granite is composed of feldspar, mica, and quartz. The feldspar may be either the flesh-colored potash variety, orthoclase, or the pure white soda variety, albite, or both potash and soda may enter into its composition. The mica varies in color from a pure silvery white, through the more common brown, into black. The quartz is generally white, seldom dark-gray or brown. The predominance of one or other of the ingredients, or of a particular variety, gives the peculiar color to the mass, which is generally either red, gray, or white. The red is produced from the predominance of orthoclase; the white, of albite; and the intervening gray from the mica, or sometimes from the quartz. The feldspar forms generally a half, and sometimes even more of the bulk of the rock; the mica in one variety, and the quartz in another, are so minute as to be scarcely visible. Sometimes the feldspar separates into large and distinct crystals forming a porphyritic granite. The substitution of hornblende for mica produces that variety called syenite (q.v.); and if talc takes the place of the mica, the rock is called protogene (q.v.). When the ingredients exist in a compact and finely granular condition, the compound is known as eurite. Sometimes, especially in veins, feldspar and dark quartz are arranged so as to produce an imperfect laminar structure, which, when broken at right angles to the laminæ, presents numerous broken and angular lines that have a faint resemblance to Hebrew characters, whence it is called graphic granite.

Granite is largely used as a building material in bridges and engineering-works, and also in public buildings and dwellings. The difficulty of working it makes it expensive, but this is counterbalanced by its great durability. It cannot be cut, like the majority of building-stones, with saws, but is first worked with large hammers, and then with pointed chisels. The success with which the Egyptians operated upon this refractory stone is very extraordinary. They worked and polished it in a way which we cannot excel, if, indeed, we can come up to it, with all the appliances of modern science; and not content with polishing, they covered some of the blocks with the most delicate and sharply cut hieroglyphics!

The granites best known for ornamental purposes are the gray Aberdeen granite and the reddish colored Peterhead granite. Of this last-mentioned variety, handsome polished columns for public halls have been constructed.

The soil produced by the weathering of granitic rocks should be fertile, as their chemical composition contains the necessary elements. The great hardness of the rock, and its resistance to atmospheric influences, prevents a soil of any thickness being formed; and even where it exists, at least in our temperate regions, it is generally so high and exposed, that it is unfavorable to vegetation; in warmer climates, such soils are frequently very fertile.

GRANMICHE'LE, a t. of Sicily, in the province of Catania, and 30 m. s.w. from Catania, on a mountain ridge, at an elevation of 1768 ft. above the sea. Beautiful marbles are produced in the neighborhood. The town was founded in the end of the 17th c., by the Branciforte family, and peopled with the inhabitants of the neighboring town of Occhialà, which was destroyed by the earthquake of 1693. Pop. 10,058.

GRAN SASSO D'ITALIA ("Great Rock of Italy"), also called MONTE CORNO, from the resemblance to a horn which it presents on the e., is the highest summit of the Apennines, having an elevation of 10,206 ft. It is situated on the borders of the Abruzzi, between Teramo and Aquila. It owes its name partly to its height, and partly to its being formed of a single mass of calcareous earth from its middle to its summit. It is seen to great advantage from the side of Teramo, where it is broken into tremendous precipices. The summit is covered with perpetual snow. Wolves, bears, and chamois abound on the mountain—the last of these animals being found in no other part of the Apennines. The general character of the scenery is more Alpine than Apennine, and in wild grandeur and variety it is not surpassed by any landscape in Italy. To the painter, geologist, and botanist it affords a rich field for their respective pursuits. See *Itinerary* of F. Caldane.

GRANT, a co. in s. central Arkansas on Saline river; 650 sq.m.; pop. '70, 3,943—389 colored. The surface is hilly, and to a large extent covered by forests. The chief productions are cotton, corn, hay, and pork. Co. seat, Sheridan.

GRANT, a co. in e. Dakotah, on the Minnesota border, s.w. of Big Stone lake. It is unsettled, and almost destitute of forests.

GRANT, a co. in n.e. Indiana on the Mississinewa river, crossed by the Pittsburgh, Cincinnati, and St. Louis, and the Cincinnati, Wabash, and Michigan railroads; 420 sq.m.; pop. '70, 18,487. It is mostly level and fertile; about a third being woodland. Corn, wheat, oats, and pork are the main products. Co. seat, Marion.

GRANT, a co. in s.w. Kansas, on the Cimarron river and its branches; 576 sq.m.; formed after the census of 1870. It consists almost entirely of prairies.

GRANT, a co. in n. Kentucky, drained by Eagle creek and crossed by the Cincinnati Southern railroad; 200 sq.m.; pop. '70, 9,529—509 colored. Surface undulating and soil fertile, producing corn, wheat, hay, etc. Co. seat, Williamstown.

GRANT, a parish in central Lousiana, on Red river and Saline bayou; 500 sq.m.; pop. '70, 5,417—2,414 colored. The surface is mostly level, and the soil fertile. The main productions are cotton and corn. Seat of justice, Colfax.

GRANT, a co. in w. Minnesota on the Mustinka and Pomme de Terre rivers, crossed by the St. Paul and Pacific railroad; 625 sq.m.; pop. '75, 1119. The surface is undulating prairie, with many small lakes. The soil is fertile and favorable for wheat. Co. seat, Elbow Lake.

GRANT, a co. in the extreme s.w. of New Mexico between the Rio Grande and Arizona, drained by the Gila; about 10,000 sq.m.; pop. '70, 1143. The surface is rough and in some parts mountainous, with fertile valleys. Wheat, corn, and grass are the chief products. Water and timber are scarce on the high lands. The precious metals and copper are found. Co. seat, Pinos Altos.

GRANT, a co. in e. Oregon, on the John Day river; 21,000 sq.m.; pop. '70, 2,251. The surface is rough, the Blue mountains occupying a considerable area. Cattle, wheat, and lumber are the chief products. Gold has been found in large quanties. Co. seat, Cañon City.

GRANT, a co. in n.e. West Virginia, drained by affluents of the Potomac and traversed by branches of the Alleghany range; 460 sq.m.; pop. '70, 4,467,—331 being colored. Some portions are fertile, producing wheat, corn, and cattle. Co. seat, Maysville.

GRANT, a co. in s.w. Wisconsin between the Mississippi and Wisconsin rivers and drained by the Platte and Grand; 1100 sq.m.; pop. '75, 39,086. The surface is varied and the soil very fertile, producing corn, wheat, oats, etc. Co. seat, Lancaster.

GRANT, in English law, the conveyance of real property by deed. Originally, the term grant was confined to the conveyance of incorporeal hereditaments and estates in reversion; according to the maxim that incorporeal property lay in grant, and corporeal property in livery, it being impossible to give actual sasine of that which had no tangible existence, or was not in the possession of the grantor. In order to complete the conveyance of a reversion or remainder by grant, it was necessary that the tenant of the particular estate should acknowledge the grantee by attornment. The necessity for attornment was abolished 4 and 5 Anne, c. 16, s. 9. By 8 and 9 Vict. c. 106, it is enacted that estates, corporeal as well as incorporeal, may be conveyed by grant.

GRANT, Mrs., of Carron, author of the popular song of *Roy's Wife of Aldivalloch*, was born near Aberlour, in Banffshire, about the year 1745. She was twice married—first to her cousin, Mr. Grant of Carron, near Elchies, on the river Spey; and secondly, to Dr. Murray, a physician in Bath. She died at Bath about 1814.

GRANT, Mrs. Anne, a miscellaneous writer, whose works were among the first to draw public attention to the romantic scenery and peculiar manners of the Scottish highlands, was born in Glasgow in 1755. She was the daughter of a British officer named M'Vicar, who became barrack-master of fort Augustus. She married the rev. James Grant, chaplain of the fort, and subsequently minister of Laggan. Left a widow in destitute circumstances, Mrs. Grant published by subscription a volume of *Poems* (1803), which were well received; in 1806, *Letters from the Mountains*—a highly popular work; in 1808, *Memoirs of an American Lady;* in 1811, *Essays on the Superstitions of the Highlanders of Scotland;* etc. In 1825 Mrs. Grant received from government a pension of £100 a year. She died in 1838.

GRANT, Charles, Lord Glenelg, was born in India, at Kidderpore, presidency of Bengal, in 1779. He was of a highland family, the Grants of Shewglie. His grandfather (who was slain at the battle of Culloden) married one of the Macbeans of Kinchyle; and his father was born in Aldourie House, and the banks of Loch Ness, also the birthplace of sir James Mackintosh. The father of lord Glenelg (also Charles Grant) went early to India, became one of the most distinguished directors of the East India company, represented for many years the county of Inverness in parliament, and was, along with Wilberforce, Thornton, Zachary, Macaulay, and others, a leading member of the Clapham sect, described by sir James Stephen in his *Ecclesiastical Essays*. He died in 1823, aged 77. Charles, his eldest son, was carefully educated, and distinguished himself at Magdalene college, Cambridge, where he took his degree of M.A. in 1804. In 1805 he published a poem on the *Restoration of Learning in the East*, which had carried the university prize awarded by Dr. Claudius Buchanan. He was called to the bar in 1807, but never practiced. In 1811 he was elected M.P. for the Inverness district of burghs; and afterwards succeeded his father in the county representation, he continued in the house of commons for a period of 25 years, at the expiry of which he was raised to the peerage by letters-patent bearing date May 8, 1835. Grant held for five years the office of a lord of the treasury; and in 1819 succeeded to the important appointment of secretary for Ireland, which he continued to fill for about two years. He was the first secretary for Ireland that sought to carry out conciliatory measures. He

endeavored to suppress the orange demonstrations, to secure impartial administration of justice, and to devise a system of national education adapted for Catholics as well as Protestants. Nearly all that has since been done was proposed by this enlightened statesman, and the future historians of Ireland will point to him as one of the genuine though ill-requited benefactors of that country. From 1823 to 1827 Grant was vice-president of the board of trade; from 1830 to 1834, president of the board of control; and from Nov. 1834 to Feb. 1839, secretary of state for the colonies. After this period, Grant withdrew in a great measure from public affairs, but supported the liberal party by his vote. He died at Cannes, in France, in 1866. Lord Brougham pronounced Grant to be "the purest statesman he had ever known." He was an eloquent speaker, though partly from diffidence, and partly from indolence, he spoke but seldom. Some of his despatches as colonial secretary, on the rights of the natives in the colonies, on repressing idolatry, and abolishing slavery throughout the British possessions in south Africa, are models of elevated and just thought, and of fine impressive English.

GRANT, FRANCIS, Lord CULLEN, a Scottish judge and political writer, was the son of Archibald Grant of Belinton, a cadet of the family of Grant of Grant, chief of the clan of that name. He was born about the year 1660, was educated first at Aberdeen, and afterwards at Leyden, adopted the profession of the law, and distinguished himself by his loyal zeal for the successive governments of William III., queen Anne, and George I. He wrote in favor of the union, on the observance of the Sabbath, on the law of patronage in the church, essays on law, religion and education, and reflections on the rebellion of 1715. For seventeen years he filled the position of a judge with great ability and integrity. He died at Edinburgh in 1726.

GRANT, Sir FRANCIS, fourth son of Francis Grant of Kilgraston in Perthshire, was born in Edinburgh, 1803. He received his education at Harrow and at the university of Edinburgh, and was, it is said, originally intended for the Scottish bar, but soon abandoned all thoughts of legal honors, to follow his natural genius for painting. He studied drawing under Somerville, a local artist of some repute, and was enabled, by the kindness of lord Elgin, to form his taste in that nobleman's gallery. A noble portrait by Valasquez is said to have exercised an especial influence over the young painter's future art career. His first picture was exhibited in 1834, when he at once took rank among the best portrait painters of the day, and was regarded as a worthy successor of the courtly Lawrence. His most famous works are those in which he has combined the likenesses of distinguished characters with scenes of English sports. The "Meet of H.M. Stag-hounds," painted in 1837 for lord Chesterfield, and containing no less than 46 portraits; the "Melton Hunt," executed for the duke of Wellington; and the "Cottesmore," for sir R. Sutton, are the best known in this class. Among his other paintings, may be mentioned the equestrian portraits of the queen and prince Consort for Christ's hospital; the picture of the beautiful marchioness of Waterford; and those of lords Palmerston, Russell, Gough, Macaulay, Hardinge, etc. In 1842 Mr. Grant was elected associate, and in 1851, academician. In 1855 he received one of the three gold medals awarded to British artists at the Paris exhibition (for his "Meet of H.M. Stag-hounds"), and was also elected member of the Belgian academy. In 1866 the president's chair in the royal academy having become vacant, through the death of sir C. Eastlake, and neither sir E. Landseer nor Maclise being desirous of the post, Mr. Grant was elected in Feb. by 23 votes out of 29, and soon after received, according to ancient precedent, the honor of knighthood. In 1870 he received the degree of D.C.L. from Oxford. Sir Francis was twice married, his first wife being a Miss Farquharson of Invercauld; his second, a daughter of Mr. and Lady Elizabeth Norman, by whom he had a numerous family. He died Oct., 1878.

GRANT, JAMES, of Corrimony, in Inverness-shire, born in 1743, died in 1835, was author of *Essays on the Origin of Society*, 1785, and *Thoughts on the Origin and Descent of the Gael*, 1814. The latter is a learned and ingenious work, imbued with Celtic feeling and enthusiasm.

GRANT, JAMES, b. Edinburgh 1822. While a boy he was for several years with the British army in Newfoundland, was made an ensign, and, in 1840, had charge of the military depot at Chatham. He left the service to devote his attention to literature, and the study of Scotch antiquities. His first work (1846) was *The Romance of War, or Highlanders in Spain.* This was followed in rapid succession by more than 40 different works, of which the more important are *Adventures of an Aide de Camp; Kirkcaldy of Grange; Memoirs of the Marquis of Montrose; Walter Fenton, or the Scottish Cavalier; Bothwell, or the Days of Mary Queen of Scots.* Many of his books are on martial themes but among them are a number of novels. A considerable number have been reprinted in the United States. In 1875 Grant left the Protestant church and became a Roman Catholic.

GRANT, JAMES AUGUSTUS. b. Scotland 1827; educated at Aberdeen; served in the English army in India, and was with gen. Havelock at Lucknow. In 1863 he was with Speke in exploring the sources of the Nile. In the Abyssinian expedition he was at the head of the intelligence department under lord Napier. He has published *A Walk Across Africa; Botany of the Speke and Grant Expedition,* and various papers in the scientific journals.

GRANT, Sir JAMES HOPE, b. Scotland 1808; served in the British army in the first Chinese war, and through the Punjab campaign in 1848–9. In 1858 he was made maj.gen. He was distinguished at the seige of Delhi, and the relief of Lucknow, and also in movements at Cawnpore. He directed and brought to a successful close the British campaign in China which terminated with the capture of Peking in 1860. In 1861 he was lieut.gen. and commander-in-chief at Madras. He has published *Incidents in the Sepoy War*.

GRANT, PATRICK, Lord ELCHIES, a Scottish judge, was b. in 1690. He collected the decisions of the court of session from 1733 to 1757, and wrote annotations on lord Stair's institutes. He was celebrated as an acute and learned lawyer. He died in 1763. His son, JOHN GRANT, became one of the Barons of Exchequer in Scotland.

GRANT, Sir ROBERT, governor of Bombay, brother of Lord Glenelg, was b. in 1785. In 1801 the brothers took their degree of B.A. together in Cambridge, Charles being third, and Robert fourth wrangler, with the additional distinction of Charles being first, and Robert second medallist. The latter was called to the bar at Lincoln's Inn in 1807, sat for some time in the house of commons as member for Inverness, and afterwards for Norwich and for Finsbury. In 1834 he was knighted, and appointed governor of Bombay. He died at Dapoorie in 1838. He was author of two treatises on Indian affairs, and of several hymns and short poetical pieces, greatly admired, which was collected and published by lord Glenelg in 1839.

GRANT, ULYSSES SIMPSON, eighteenth president of the United States, was b. at Point Pleasant, Clermont co., Ohio, April 27, 1822; graduated at the military academy of West Point in 1843, and served under gen. Taylor in the war with Mexico, 1846, up to the capture of Monterey. His regiment was then transferred to the expedition under gen. Scott, and he took part in every action from Vera Cruz to Mexico, and was brevetted first-lieut. and capt. for meritorious conduct at Molino del Rey and Chapultapec. In 1852 he served in Oregon; but in 1854 resigned his commission, and settled at St. Louis, Missouri, whence, in 1859, he moved to Galena, Illinois, and engaged in the leather trade. At the beginning of the war of secession in 1861, he volunteered his services, and was appointed col. of an Illinois regiment. In August he was appointed brig.gen., commanding the important post of Cairo, occupied Paducah, and led an expedition on the Mississippi. In Feb., 1862, he distinguished himself in the capture of fort Donelson, on the Tennessee River, and was made maj.gen. On April 6, following, after a preliminary defeat, he won a great battle over the confederates at Pittsburg Landing, or Shiloh. Succeeding gen. Halleck in the w., he commanded the land-forces which, in conjunction with the navy, reduced Vicksburg, July 4, 1863, soon followed by the fall of fort Hudson, and the opening of the Mississippi. He then took command of the army of Tennessee, and defeated gen. Bragg at Chickamauga, in September of the same year; and was, in 1864, appointed lieut.gen. and commander-in-chief, and personally directed the operations of the great final struggle in Virginia, in which the northern forces, though often repulsed with heavy losses, finally compelled the evacuation of Richmond, April 2, 1865, followed on the 9th by the surrender of the confederate army under gen. Lee, and soon after of the entire confederate forces. Congress, in recognition of his eminent services, passed an act reviving the grade of "General of the Army of the United States," to which Grant was immediately appointed. In 1868 he was elected, on the "republican" platform, president of the United States; and having in 1872, been re-elected over Horace Greeley, he retired in 1877, after his second term of office. In the latter year Grant visited Europe, everywhere receiving a hearty welcome, and completed a tour round the world in 1879. Simple, reticent, earnest, and persevering in his character, he owed his military success not so much to strategy as to superior numbers and resources, and hard fighting, in which even a series of victories left his enemy less able to resist. During Grant's presidency a great reduction was made upon the national debt incurred during the civil war. The military government of the southern states in those years cannot be regarded as successful. The most important event connected with relations to foreign states was the settlement of the Alabama question by the "joint high commission" in 1871.

GRANT, ULYSSES SIMPSON (*ante*), the most famous of American soldiers, and president of the United States from Mar. 4, 1869, to Mar. 4, 1877, won his great reputation in the war of secession, into which he entered as the col. of an Illinois regiment, and out of which he came as the successful leader of the national armies, and holding a place in the hearts of his countrymen hardly less exalted than that so long held by Washington. He is of Scotch ancestry, from which he no doubt inherited the qualities that fitted him to conquer the most formidable rebellion of either ancient or modern times. Educated at West Point, he did good service as a subordinate officer in the war with Mexico, resigning a few years afterwards and entering upon an inconspicuous career, first as a farmer in the neighborhood of St. Louis, and afterwards as a leather merchant in Galena. In the latter position he was found when the war of the secession began in 1861. He promptly offered his services to the government without stipulation or reserve, and of all those who knew him there was probably not one who had the slightest suspicion that he would develop a great capacity for military leadership. It may even be doubted that he himself had any anticipations of the career so soon to open

before him. If his breast heaved with great hopes and ambitions, the reticent man kept them strictly to himself and went quietly to the discharge of whatever duty he was required to perform. In looking now at the early stages of his career, we see an exhibition of the pluck and pertinacity as well as the shrewd common sense that were afterwards so conspicuous. He was faithful in the few things he was at first called to undertake, thus proving his capacity for higher duties. There is no evidence that he ever sought to push his fortunes at the expense of other commanders, or that he was in haste to rise faster than the government discovered cause for his promotion. His victories were always modestly announced, without the least sign of a purpose to draw attention to himself or win the applause of his countrymen. If he was aware that such modesty on his part was more likely to kindle the admiration of the country than any amount of boastfulness, it is only another evidence of his high soldierly qualities and of his superiority over those who, for want of such perception, were constantly creating obstacles to their advancement. He went quietly and submissively to the discharge of whatever task was assigned him, never grumbling over difficulties, or asking to be placed in a more conspicuous or honorable position. In nothing more than this did he show the qualities of a great soldier, by nothing else did he more endear himself to his countrymen. He was in this respect a gen. after Lincoln's own heart, and it is no wonder that the latter discerned his merits and charged him with greater and greater responsibilities, until at last he exalted him to the post of commander of all the forces in the field. Shortly after entering the service he was advanced from the position of col. to that of brig.gen. of volunteers and assigned to the command of the forces at Cairo. Sept. 6, 1861, he seized Paducah, at the mouth of the Tennessee, and on the 25th, Smithland, at the mouth of the Cumberland, two important strategic points. His next move, a month later, was to check the advance of a rebel force under gen. Jeff. Thompson, which was successfully accomplished by two battles, one at Fredericktown, Mo., the other at Belmont, in the latter of which he had a horse shot under him. The district of Cairo was now enlarged and gen. Grant confirmed in command thereof. In Feb., 1862, he moved from Paducah with 15,000 men, aided by commodore Foote with a fleet of gunboats, for the purpose of capturing fort Henry, on the Tennessee, and fort Donelson, on the Cumberland. The former surrendered Feb. 6, its reduction being mainly the work of the gunboats; the latter was taken on the 16th only after a severe battle in which the land forces were engaged. Buckner, who was in command of the fort, proposed the appointment of commissioners to settle the terms of capitulation; to which gen. Grant replied: "No terms other than an unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." The capture of this fort was the first important and brilliant victory of the federal arms, and it made a great impression upon the country. Gen. Grant was at once made a maj.gen. of volunteers, his commission being dated on the day of the battle. The battle of Pittsburg Landing was next fought. The union forces at that point had lost their commander by death, and while halting were attacked Feb. 6 by a large confederate force under Albert Sidney Johnston and beaten with heavy loss. Gen. Grant arrived on the field at the critical moment and reformed the broken union lines, and heavy re-inforcements under gen. Buell having arrived, the battle was renewed on the 7th and the confederates driven back to Corinth. The loss on each side in this battle was 12,000 men, and gen. Grant was slightly wounded. Gen. Halleck being called to Washington, gen. Grant was assigned to the command of the department of the Tennessee, with headquarters at Corinth, which the confederates had evacuated. Here he was much annoyed by spies and guerillas, against whom he adopted the most energetic measures. He next fought the confederate gen. Price at Iuka and defeated him. He then removed his head-quarters to Jackson, leaving Rosecrans with 20,000 men to hold Corinth, which he did successfully, though attacked by a force twice as great as his own. In Oct. gen. Grant's department was enlarged by a portion of Mississippi, including Vicksburg, the forces under his command being designated as the 13th army corps. After several unsuccessful efforts to capture Vicksburg, it was besieged May 18, and surrendered July 4, 1863, with about 27,000 prisoners. Gen. Grant was now appointed a maj.gen. in the regular army, and in Oct. placed in command of the military division of the Tennessee, comprising the departments commanded by Sherman, Thomas, Burnside, and Hooker. His next exploit was the defense of Chattanooga by driving the forces of Bragg from Missionary ridge and Lookout mountain. Gen. Halleck, in his annual report to the war department, said that in view of the strength of the rebel position and the difficulty of storming his intrenchments, "the battle of Chattanooga must be considered the most remarkable in history. Not only," he continues, "did the officers and men exhibit great skill and daring in their operations on the field, but the highest praise is due to the commanding gen. for his admirable dispositions for dislodging the enemy from a position apparently impregnable." Congress at its next session promptly returned thanks to gen. Grant and his army, and ordered a gold medal to be struck in his honor. Congress also revived the grade of lieut.gen. in the army, whereupon gen. Grant was nominated by president Lincoln for the position, and the nomination promptly confirmed by the senate. He came to Washington, received his commission at the hands of president Lincoln, and returned with all speed to Tennessee. In a letter to gen. Sherman, written after his appointment, he frankly acknowledged his success in

the field was "due to the energy, skill, and the harmonious putting forth of that energy and skill, of those whom it has been my good fortune to have occupying subordinate positions under me." His first general order as commander was issued Mar. 12, 1864, and announced that his head-quarters would be in the field, and, until further orders, with the army of the Potomac. The war, which had existed for three years, and been attended with immense sacrifice of life and property, and an unwavering hope of final victory for the union and liberty, was now approaching its culmination. The successes of gen. Grant in subordinate positions had awakened among the northern people a perfect assurance that, as commander of all the union forces, he could not fail to bring the conflict to a speedy and honorable conclusion. His quiet confidence in himself was sustained by the hearty devotion of the army and the support of a united people. The battles of the next year, which had for their object the capture of Richmond, at which point the secessionists had concentrated their main army for a last and desperate resistance, were the bloodiest of the whole war. The first movements of gen. Grant, though unsuccessful as to his main design, resulted in crippling the enemy and so preparing the way for final victory; but they were attended with great loss of life. In the campaign from the Rapidan to the James, between May 3 and June 15, the union loss in killed, wounded, and missing, was 54,551. The confederate losses are estimated at 32,000. Gen. Grant, having failed in his flanking movements, saw at last that his only hope of seizing Richmond depended upon first taking Petersburg, and to this object he now addressed himself with his usual pluck and pertinacity. Lee attempted to create a division by a movement on Washington, but was foiled and driven back by Sheridan. Sherman meanwhile had forced Hood to evacuate Atlanta, and was on his famous march to the sea. Lee was so effectually beleaguered by Grant in the approach to Richmond that he was unable to send reinforcements tc his generals at other points, and the confederacy was rapidly falling to pieces. At length, on April 2, 1865, Petersburg fell, and on the 3d the union forces entered Richmond, the confederates fleeing as they advanced. Grant pursued the flying army, caught and surrounded it, and forced it to surrender at Appomattox court-house, April 9. Lee, with 27,000 men—all that remained of his army—was captured, and the confederacy overthrown. Grant's entire loss in the campaigns of the year was 12,663 killed, 49,559 wounded, and 20,498 missing; total, 82,720. In the same time he had captured more than 66,000 confederate soldiers; how many he had killed and wounded is not known. The terms granted to Lee were most magnanimous, and all the forces of the confederacy made haste to disband on similar conditions. The rebellion was put down, the union restored, and Grant was the hero of the day. The assassination of Lincoln and the accession of Andrew Johnson quickly followed, and then came the excitement of the period of reconstruction, in which gen. Grant, for whom congress had created the rank of gen. of the army, bore a loyal and honorable part. In 1868 he was elected president, receiving 214 electoral votes, to 80 cast for Horatio Seymour. In spite of unfortunate divisions in the republican party, he was re-elected in 1872, receiving 286 electoral votes, while but 42 were cast for the opposing candidate. At the close of his second term, in 1877, he made the tour of the whole civilized world, visiting especially all the great nations of Europe and Asia, and receiving, as a great soldier and civilian and the first citizen of the United States, all the honor which rulers and people could bestow. As the unofficial representative of his country, in the nations he visited his bearing was such as to win universal admiration and respect. His intercourse, moreover, with the rulers and other representative men abroad, was, no doubt, calculated to remove the prejudices and conciliate the good-will of foreign nations toward the great republic of the new world. On his return home in the spring of 1880, a large and influential portion of the republican party sought to make him a candidate for the presidency once more; but the movement was defeated, not because the people did not still admire and trust him, but on account of the formidable opposition to bestowing the office upon any man, however eminent or noble, for more than two terms.

GRANT, Sir WILLIAM, an eminent lawyer, was descended form the Grants of Baldornie, and was b. at Elchies in Strathspey, in 1754. He was some time attorney-general in Canada, then M.P. for Shaftesbury, and subsequently for Banffshire; was sixteen years master of the rolls, from which he retired in 1817, and died in 1832. Lord Brougham describes him as the greatest magistrate that ever adorned the English bench; and Charles James Fox declared that he was the only man in the house of commons whom he had any diffidence in replying to. This arose from the fact, that Grant was a most logical debater and close reasoner.

GRANTHAM, a municipal and parliamentary borough and market-town of England, in the co. of Lincoln, is situated on the left bank of the Witham, 23 m. s.s.w. of the city of Lincoln, and about 110 m. n.n.w. of London. Grantham has a free grammar-school, with an income from endowment of £800 a year. The parish church, a beautiful structure of the 13th c., has a fine spire 273 ft. high. Here Newton was instructed in classics before entering Cambridge. A canal 30 m. long connects this town with the river Trent. The trade is chiefly in malt, corn, and coal. Grantham returns two members to the imperial parliament. Pop. of parl. bor. '71, 13,250.

GRANULA'TIONS, the materials of new texture as first formed in a wound or on an ulcerated surface. See INFLAMMATION, CICATRISATION, WOUNDS, ULCER.

GRANVELLE, ANTOINE PERRENOT, Cardinal de, 1517–86; b. France, but a Spanish statesman. He was the son of the chancellor of Charles V.; was thoroughly educated, and excelled as a linguist. Before he was 25 he was bishop of Arras. At the Trent council he defended his sovereign's policy of war upon France, for which he was made a councilor of state. In 1550 he was chancellor, succeeding his father. As a diplomatist he was engaged in the treaty of Passau, and in arranging the marriage of Philip with Mary of England. When Philip came to the throne, Granvelle was made chief-minister, and was principal adviser in the affairs of the Netherlands. After Philip left for Spain, Granvelle became supreme, and soon made his administration odious to the Flemish people, as his whole power was exerted to restore the domination of the church of Rome. He increased his power by bringing in Spanish soldiers, making new bishops, and refusing to call together the general assembly. But when he proposed to establish the inquisition, the wrath of high and low alike centered upon him. He was made a cardinal in 1561. William of Orange, Horn, Egmont, and at last Margaret of Parma (the Spanish regent) asked for his recall. Philip refused, but the unpopular cardinal foresaw trouble and probable danger, and of his own accord asked to be withdrawn. He went to Besançon, and occupied his leisure in literary and scientific studies. Subsequently he negotiated the alliance between Spain, Vienna, and Rome, against the Turks, and was viceroy of Naples. In 1575 he was called back to Spain, and made chief officer of the supreme council, in which capacity he arranged the union between Spain and Portugal, and while Philip was out of the country he acted as regent. He was a patron of literature, and richly endowed the college of Besançon.

GRANVILLE, a co. in n. North Carolina on the Virginia border, crossed by the Raleigh and Gaston railroad, and drained by Tar river; 750 sq.m.; pop. '80, 31,285—17,683 colored. The surface is hilly and the soil fertile. The main productions are corn, oats, wheat, tobacco, and cotton. Co. seat, Gaston.

GRANVILLE, a t. and village in Washington co., N. Y., on Pawlet river, and the Rensselaer and Saratoga railroad, 66 m. n. of Albany; pop. of township in '80, 4,149. Granville female seminary is in the n. village. Granville proper has some manufactures, good schools, and a number of churches. Near by are quarries of excellent slate.

GRANVILLE, a t. and village in Licking co., Ohio, on Raccoon creek, about 25 m. e. of Columbus, a short distance from a station on the Baltimore and Ohio railroad; pop. of township 2,127. The Denison university (Baptist) in the village, has a fine library. The Granville female college is also a prominent educational institution, and there are good public schools.

GRANVILLE, a fortified t. and seaport of France, in the department of La Manche, is situated on a promontory surmounted by a fort, 23 m. n.e. of St. Malo. It is a badly built, dirty, and uninteresting town; the extensive new pier, built in a sufficiently strong manner to admit of its being mounted with cannon, and the old parish church of gray granite, built in the flamboyant style, being almost the only noteworthy features. Its harbor, though well-sheltered and capable of accommodating 90 ships, is always dry at low water. The principal trade of Granville is in the whale, cod, and oyster fisheries. Pop. '76, 12,372.

GRANVILLE, GRANVILLE GEORGE LEVISON GOWER, Earl, b. England 1815; educated at Oxford; in 1836 in the embassy to France; the next year in parliament, and re-elected in 1837. In the commons he was a liberal and a free trader. He became a peer in 1846, vice-president of the board of trade in 1848, and went into the cabinet in 1851, at the close of that year succeeding Palmerston in the foreign office. He retired with the Russell ministry. In 1853 he was president of the council, and two years afterwards undertook the ministerial leadership in the house of lords. In 1850 he was vice-president of the royal commission for the great exhibition to which enterprise he rendered important services. In 1856 he was special representative of his government at the coronation of the czar. Besides filling other positions, the earl has been colonial secretary for foreign affairs (succeeding Clarendon). When Gladstone retired from the leadership of the opposition, Granville, by general consent, was looked upon as the leader of the liberals.

GRAPE. See VINE, *ante*.

GRAPE-HYACINTH (*Muscări*), a genus of bulbous-rooted plants, of the natural order *liliaceæ*, nearly allied to the hyacinth, but differing in the globose or subcylindrical perianth, contracted at the mouth, and 6-toothed. The species are natives chiefly of the countries near the Mediterranean, and the warmer temperate parts of Asia. Some of them are frequent in our flower-borders. *M. moschatum* has a smell of musk. *M. racemosum* is a somewhat doubtful native of the s. of England. The flowers of the grape-hyacinths are mostly blue.

GRAPE-SHOT, called also *tier-shot*, consist of bullets or small iron balls piled round an iron pin, holding together a series of parallel iron plates (each the diameter of the cannon used), between which are the shot, kept in their places by holes in the plates.

Small 3½ in. or 4 in. shells are also quilted together like grape for firing from mortars at short range, as, for example, in clearing the covert-way of a fortress from the third parallel. In either case, the explosion of the charge bursts asunder the binding, and the shot (or shells) begin to scatter directly on leaving the muzzle of the piece. Grape are very formidable against dense masses of troops; but, of course, only at comparatively short ranges. The shot employed differ in weight from 6 oz. to 4 lbs., according to the caliber of the gun from which they are fired.

GRAPE-SUGAR. See SUGAR; and GLUCOSE.

GRA'PHIS (Gr. *grapho*, to write), a genus of lichens, which gives its name to a tribe, *graphideæ*, remarkable for the resemblance which the fructification (*apothecia*, or *shields*) assumes to the forms of the letters of oriental alphabets. Hence, some of these little plants have received such names as *Scripture-wort*. A peculiar importance has recently been acquired by some of the *graphideæ*, from their being found only on the bark of a particular species of *cinchona*, so that they guide to the ready identification of some of the most valuable commercial barks.

GRAPHITE. See BLACK LEAD.

GRAPHOMETER, a name sometimes, though inappropriately, given to the protractor, an instrument used in plotting surveys. It is a semi-circle, marked with 180°, and, in large instruments, with parts of degrees. Its use is to lay off angles. See PROTRACTOR.

GRAPH'OTYPE is one among numerous modes invented within the last few years of producing an engraved surface from which printing can be effected by the ordinary press. Line-engraving, mezzotinto engraving, aquatint, and etching present the design or picture in *intaglio* on a metal plate, the lines being cut, and therefore below the surface of the plate; they cannot be printed by ordinary typography, because the ink-roller inks the parts that ought to be left clean, and leaves the lines of the device untouched. Wood-engravings, and stereotypes and electrotypes taken from them, can be printed side by side with type in the same page, and by the same operation; and hence the vast extension of this mode of illustrating books and newspapers. The inventors of *graphotype* are trying to introduce a cheap substitute for engraved wood-blocks. Mr. De Witt Clinton Hitchcock, a draughtsman and wood-engraver, having occasion for a little enamel white powder, scraped some from the surface of a visiting-card, and then observed that the ink-lines remained just as distinct and prominent as before, not having been removed by the scraping. This slight incident suggested the new process—sketching the design on a chalky surface, and brushing away the chalk from between the lines. Mr. Hitchcock's first experiments were partially successful, and he then received aid from others in establishing a *modus operandi*. In the latest form of the process, after many intermediate experiments, the block is superseded by a zinc plate covered with finely-pounded French chalk, brought to a hard and very fine texture by enormous pressure, with a glossy surface produced by an interposed steel plate. On this white surface, sized and dried, the picture is drawn with camel or sable hair pencils, dipped in an ink made of glue and lampblack. When dry, the white or uninked portions are rubbed down by means of a small fitch-hair brush, and pads covered with silk velvet. The rubbing is continued until the white is sunk sufficiently below the level of the inked picture or design. The plate is then saturated with liquid glass or silicate of soda, which converts the French chalk into a kind of marble. The success with which all the white is rubbed down between the inked lines, depends on a variety of circumstances—the hardness of the white, the evenness of the surface, the completeness of the petrifying action by the silicate, the protecting power of the ink or varnish, the quality of the brushes and rubbing-pads, and the careful management of the rubbing itself. Whether the fine lines of the device can be preserved from breaking up into saw-like irregularities, and whether the numerous requirements and qualities of a wood-engraving can be successfully realized, a long course of trial can alone show. The matter has been taken up by a company.

GRAPPLE-PLANT (*Uncaria procumbens*), a procumbent plant of the same genus with the gambir (q.v.), a native of south Africa. The seed-vessel has many hooked thorns, and clings most tenaciously to any animal—a provision for the distribution of the seed. When it lays hold of the mouth of an ox, Livingstone says, the animal stands and roars with pain and a sense of helplessness.

GRAP'PLING-IRON, OR **GRAPNEL**, a sort of small anchor, having several pointed claws, used generally in making fast boats and other small vessels. A similar instrument of more formidable dimensions is employed during action for grappling the rigging of a hostile ship preparatory to boarding.

GRAP'TOLITES, a group of fossil zoophytes, apparently nearly related to the recent sertularia. They had simple or branched polypidoms, formed of a horny substance. The cells in which the polype lived were arranged in a single series on one side of the rachis, or in a double series on both sides; the rachis was generally prolonged beyond the cells at the growing end of the polypidom. Egg capsules have been observed attached to the polypidom, exhibiting a method of reproduction similar to that in the

hydroid zoophytes. The generic division of the graptolites has been based on the arrangement of the cells.

Nearly eighty species of graptolites have been described. They are confined to the Silurian strata, and are most abundant in the hard slaty shales, which were the fine mud of the Silurian seas.

GRA'SLITZ, a small t. of Bohemia, is situated on the border of Saxony, 20 m. n.n.e. of the t. of Eger. It has manufactures of cotton goods, paper, looking-glasses, musical and mathematical instruments, and machinery. Pop. '69, 6,549.

GRAS'MERE, the name of a village and lake in Westmoreland, about 3 m. n.w. of Ambleside. The village, which is beautifully situated at the head of the lake, has an ancient church, containing Wordsworth's grave, which is marked by a plain and modestly-fashioned slab. The lake is upwards of a mile long, and about half a mile broad, is oval in form, and incloses a small island. It is girdled about by high mountains, and forms one of the most beautiful scenes in England. Pop. '71, 805.

GRASS (in Law). The grass growing on lands belongs to the person entitled to the soil, and at his death goes to the heir, and not to the executor. The period of entry as to grass-farms in Scotland is Whitsunday. Where the cattle of strangers are put into the fields of a tenant in Scotland to graze, the landlord cannot sequestrate the cattle for his rent; whereas, in England, he may distrain the cattle, and pay himself the rent.

GRASS CLOTH, a name often, although erroneously, given to certain beautiful fabrics manufactured in the east from different kinds of fibers, none of which are produced by grasses. One of these fabrics is made from the fiber of *Bœhmeria nivea*, popularly called China-grass; another, also known as *pina muslin*, from the fiber of *bromelia pigna*. See BŒHMERIA and BROMELIACEÆ.—The kinds of cloth really made from the fiber of grasses are extremely coarse.

GRASSE, a manufacturing t. of France, in the department of Alpes-Maritimes, is situated in the midst of flower-gardens, on the southern slope of a hill, 23 m. e.n.e. of Draguignan. The streets are steep, narrow, and crooked, but the houses are well built. The principal buildings are the college, hospital, and ecclesiastical school. Grasse is second only to Paris in its manufactures of essences and perfumes, made from the roses, orange-flowers, heliotropes, mint, etc., which, from the mildness of the climate, are most successfully grown in the vicinity. It has also manufactures of woolen goods, soap, leather, and olive oil; several silk-spinning factories and tanneries; and a considerable trade in oranges, citrons, wax, and honey. Pop. '76, 9,673.

GRASSE, FRANCOIS JOSEPH PAUL DE, Count and Marquis de Grasse-Tilly, 1723-88; joined the naval service of the knights of Malta in 1734, serving in Turkish and Moorish wars. In 1749 he entered the navy of France and speedly rose to be rear-admiral and chief of squadron. In 1781 he came to the assistance of the American patriots, and was instrumental in the reduction of Yorktown. Subsequently he served in the West Indies where he was utterly defeated by Rodney, the British commander.

GRASSES, *gramineæ* or *graminaceæ*, a natural order of endogenous plants, containing almost 4,000 known species, about one-twentieth of all known phanerogamous plants; whilst the *social* habit of many of them, and the vast number of individual plants within even a limited tract, give them a still greater proportion to the whole phanerogamous vegetation of the earth. They are distributed over all parts of the world; some are characteristic of the warmest tropical regions, and some of the vicinity of perpetual snow; but they abound most of all, and particularly in their social character, clothing the ground with verdure, and forming the chief vegetation of meadows and pastures, in the northern temperate zone. There is no kind of soil which is not suitable to some or other of the grasses; and whilst some are peculiar to dry and sterile soils, others are only found on rich soils with abundant moisture; some grow in marshes, stagnant waters, or slow streams, some only on the sea-coast; none are truly marine. Some grasses are annual, and some perennial; they have fibrous roots; the root-stock often throws out runners; the stems (*culms*) are round, jointed, generally hollow, except at the joints, rarely filled with pith, generally annual, and of humble growth, but sometimes perennial and woody, occasionally—as in bamboos—attaining the height and magnitude of trees. The leaves are long and narrow, alternate, and at the base sheath the culm; the sheath is split on the side opposite to that from which the blade springs; and at the junction of the blade and sheath, there is often a short membranous prolongation of the epidermis of the sheath, called the *ligule*. The flowers are generally hermaphrodite, but sometimes unisexual, and more frequently so in the grasses of tropical than in those of colder climates; they are disposed in *spikelets*, and these again generally in spikes, racemes, or panicles; they have no proper calyx nor corolla, but consist of the parts of fructification inclosed in two series of small bracts, some or all of which are sometims awned. See AWN. The two outer bracts of each spikelet are called *glumes*. In some grasses, only one glume is properly developed for each spikelet. Within the glumes are the *florets* forming the spikelet, sometimes only one, but often a larger number, each floret having generally two small bracts called *palæ* or *glumellæ*, the immediate covering of the parts of fructification. The glumes were called the calyx by the older botanists, and the palæ the corolla, but inaccurately. The stamens are hypogynous, sometimes only one, sometimes six or more, but very generally three, the anthers

attached to the filaments by the middle of their back, and easily moved by the slightest breeze. The ovary is simple, one-celled; the styles two or three, sometimes united; the stigmas feathery or hairy. The fruit is a *caryopsis*, the pericarp being incorporated with the seed; the seed consists of a small embryo, lying at the base and on the outside of a large farinaceous albumen, from which arises in great part the extreme importance of this order of plants to man; the farinaceous seeds of some of the grasses being the corn or grain which form a chief part of human food. The grasses cultivated on this account are noticed in the article CEREALIA and in separate articles. Starch is the principal substance entering into the composition of these farinaceous seeds, and is often extracted from them, either to be used by itself as an article of food, or for other economical purposes, according to the kind. Besides starch, they contain, in greater or less proportions, gluten and other similar substances, on which not a little of their nutritive value depends. The peculiarities of composition of the most important grains are noticed in the article BREAD, or under their separate heads. When, by the process of *malting* (see BEER), great part of the starch of the grain has been converted into sugar, a fermented liquor is made from it, of which beer or ale made from barley is the most familiar example; and from this, again, a spirituous liquor—as whisky—is obtained by distillation. Fermented and spirituous liquors are commonly made from different kinds of grain in different parts of the world, particularly barley, maize, rice, and millet.—Sugar is another important product of grasses, existing in large quantity in the stems of many species, and particularly abounding in the soft, internal part of some, as sugar-cane, maize, and shaloo or sugar-grass (*sorghum saccharatum*, see DURRA), from which it is extracted for use. The sugar-cane yields far more sugar than all the other plants cultivated on that account in the world. Rum—obtained by fermentation and distillation from sugar—is another well-known product of the sugar-cane, and similar liquors may be obtained from the other sugar-producing grasses.—Besides these uses, grasses are also of great importanee as affording pasture and fodder (*hay* and *straw*) for cattle. See FODDER.—The woody stems of the larger grasses are applied to a great variety of economical purposes. See BAMBOO. Those of some of the smaller grasses are much used for thatch, and are also made by plaiting into straw-hats, ladies' bonnets, etc. See STRAW-MANUFACTURES.—The underground runners of some species, as the marrum grass and sea lyme grass, make them particularly useful for binding and fixing loose sands.—The stems and leaves of many grasses have fibers of such length and strength that they are twisted into coarse ropes for many purposes in which no great durability is required. Thus, hay and straw ropes are commonly used on every farm in Britain, and different grasses are used in the same way in many parts of the world. Some grasses, as the moonja (*saccharum munja*) of India, are not simply twisted into ropes, but their fibers are first separated by moistening and beating; and the fibers of some, as the esparto (q.v.) of Spain, are made not only into ropes, but into mats, sacks, and other very coarse fabrics.—The Chinese make paper from the young shoots of bamboo; paper is also made from the straw of rye, wheat, barley, and oats, and might be made from that of many grasses. See PAPER.—The perennial roots and runners of some grasses contain peculiar substances, on account of which they are used medicinally, as those of couch-grass. The stems and leaves of some contain coumarin (q.v), and have a very agreeable fragrance when dried, as in the case of the sweet-scented vernal grass (*anthoxanthum odoratum*) of Britain. A few, chiefly East Indian species, contain other aromatic and fragrant substances in the stem and root particularly lemon grass, vittievayr, and other species of *andropogon*, which yield grass-oil (q.v.).—It has been alleged that the seeds of a few grasses are poisonous, but this in every case requires confirmation, although darnel (q.v.) in particular has a bad reputation.—The stems, leaves, and glumes of grasses contain a large proportion of silica, particularly the epidermis, so that when large quantities of them are burned, a sort of glass is formed; a fact which requires attention in questions relative to the manures proper for particular crops, and the most profitable alternation of crops in husbandry. The following are the tribes into which botanists have divided the natural order of grasses, with the names of some of the most important, as examples:

Oryzeæ.	Rice.
Phalareæ.	Maize; Job's tears (*Coix*); Canary grass; foxtail grass; soft grass; timothy grass.
Paniceæ.	Millet (of various kinds); fundi; Guinea grass.
Stipeæ.	Feather grass; esparto.
Agrosteæ.	Bent grass.
Arundeæ.	Reeds; marrum grass; pampas grass.
Pappophoreæ.	
Chloreæ.	Cord grass (*Spartina*); *cynodon; Eleusine.*
Aveneæ.	Oats; vernal grass; *aira.*
Festuceæ.	Fescue; meadow grass; manna grass; teff; cock's-foot grass; tussac grass; dog's-tail grass.
	Sub-tribe *Bambusidæ*—Bamboos.
Hordeæ.	Wheat; barley; rye; spelt; rye-grass; lyme grass.
Rottbælleæ.	Gama grass.
Andropogoneæ.	Sugar-cane; shaloo or sugar grass; durra; lemon grass; vittievayr.

The word *grass* is probably from the same root as Lat. *cresco*, Eng. *grow*.

Among farmers, the term grasses is extended to include, along with the true grasses, other plants cultivated for fodder and forage, such as clover, etc., and these are distinguished by the term *artificial grasses*, whilst the true grasses are called *natural grasses*.

GRASSHOPPER, the English name of many species of insects, forming a family of the order *orthoptera*, section *saltatoria*, called *gryllidæ* by some (chiefly English) entomologists, and *locustidæ* by others—those who adopt the former name designating the crickets (q.v.) *achetidæ*. Locusts (q.v.), however, do not belong to this family, although very closely allied, but are distinguished from it by greater robustness of frame, shorter legs, and shorter antennæ. The antennæ of the grasshoppers are long and threadlike, as in the cricket. The wings of grasshoppers, as of locusts, fold together like the sides of a roof, while those of crickets are horizontal when at rest. Grasshoppers, like crickets and locusts, have the thighs of the hinder legs very large and adapted for leaping. But grasshoppers do not leap with so great energy as locusts, nor are they capable of so sustained a flight. There are, indeed, some of the family in which the wings are merely rudimental, and the elytræ or wing-covers of small size. Most of them, however, have well-developed wings ; and the wing-covers of the males, as in crickets, have a spot at the base of a talc-like appearance, by the rubbing together of which that chirping sound is produced which is probably connected with the sexual instincts of the insects, but which we have learned to associate with the brightest of green pastures and of sunshiny days. Grasshoppers are herbivorous. They are numerous in most parts of the world. The largest British species is the great green grasshopper (*gryllus viridissimus*, also known as *locusta viridissima* and *acrida viridissima*), about 2 in. in length, and of a fine green color; a somewhat rare insect in Britain, although not uncommon in some parts of Europe. A green color prevails among the grasshoppers of Britain, and generally of temperate climates, enabling them more readily to elude observation among the herbage in midst of which they live; but some of the tropical species are richly colored, and some have very large wings, almost like those of lepidopterous insects. The greater number of grasshoppers feed on grass and the leaves of herbaceous plants, but some prefer the leaves of trees.

GRASSMAN, HERMANN GÜNTHER, b. Prussia, 1809; a mathematician, son of a professor of mathematics in the Stettin gymnasium, to whose chair he succeeded. In 1844 he published the first part of an important mathematical work in which he explained certain discoveries in the science. He has published several other works, the leading purpose of which is to establish a new system of mathematical processes covering wider ground and tending to supersede the plans and theories of Descartes.

GRASS-MOTH (*Crambus*), a genus of small moths, allied to the clothes-moths, of which the species are numerous, inhabiting pastures, where they are often seen to rise in great numbers when disturbed, and soon to settle again on the blades of grass. Their form, when their wings are closed, is long and narrow, pointed at the head, abruptly cut off at the opposite end. They are often brown and white, sometimes silvery and golden.

GRASS-OIL, a fragrant volatile oil obtained from the leaves and stems of certain grasses of the genus *andropogon* (see LEMON GRASS), natives of India. The kind known as *grass-oil of Nemaur* is produced at the foot of the Vindhya hills, and is exported from Bombay. It has been ascribed to the grass called vittievayr or cuscus (*A. muricatus*); to another species, which Dr. Royle supposes to be the *calamus aromaticus* of the ancients; and to a third, also like these, a very fragrant grass (*A. iwarancusa*). It is not improbable that it may be obtained from more than one species. It is obtained by distillation; the grass, being cut when it begins to flower, is bound in small bundles, which are thrown into a boiler with water, and the oil, as it distils over, is received in cold water, from which it is afterwards skimmed. It is of a light straw color, has a peculiar rich, agreeable odor, and is very pungent and stimulating. It is employed in medicine, as a stimulant and diaphoretic, but more frequently as a liniment in chronic rhematism. Its chief use, however, is in perfumery. It is sometimes called *ginger-grass oil*, but is commonly called *oil of geranium* by perfumers, and by druggists *oil of spikenard*.—Similar to this, but different, and obtained from other species of the same genus, is the oil known as oil of lemon grass.

GRASS OIL. See CITRONELLA.

GRASS OF PARNAS'SUS, *parnassia*, a genus of plants, generally regarded as belonging to the natural order *droseraceæ*, but referred by Lindley to *hypericaceæ*. The calyx is deeply 5-cleft, there are 5 petals, 5 stamens, and 5 scales fringed with globular-headed threads alternate with the stamens, which are regarded by Lindley as bundles of altered stamens; there are four stigmas, and the fruit is a 1-celled, 4-valved capsule with many seeds. The genus consists of a few small herbaceous plants, with flowers of considerable beauty, growing in wet situations in the colder northern parts of the world. Some of them are found within the arctic circle, and to the snow-line of the Alps, Himalaya, and other mountains. The common grass of parnassus (*P. palustris*) is an ornament of bogs and wet places in Britain and other parts of Europe, with heart-shaped leaves, mostly radical and on long foot-stalks, and one sessile leaf on the stem, which is about eight or ten in. high, and bears a solitary yellowish-white flower. It

flowers in autumn. It is called *agrostis en to parnasso* by dioscorides, whence its modern name.

GRASS TREE, *Xanthorrhœa,* a genus of plants of the natural order *liliaceæ,* natives of Australia, and constituting a very peculiar feature in the vegetation of that part of the world. They have shrubby stems, with tufts of long wiry foliage at the summit, somewhat resembling small palms; a long cylindrical spike of densely aggregated flowers shooting up from the center of the tuft of leaves. The base of the inner leaves of some species is eatable, and forms, particularly when roasted, an agreeable article of food. It has a balsamic taste; and all the species abound in a resinous juice, which, on exposure to the air, hardens into a reddish yellow inodorous substance with a shining fracture, soluble in alcohol, and useful as a tonic in dysentery, diarrhœa, and other intestinal maladies; used also by the natives of Australia for uniting the edges of wounds, and with an aluminous earth for caulking their canoes, and as a cement for various purposes. The common grass tree (*X. hastilis*) has a stem about four feet high, but sometimes a foot in diameter. It is of very slow growth, and is supposed to be many centuries old when it has reached such dimensions.—Several species are found in eastern Australia, where their leaves are used as fodder for all kinds of cattle.

GRASSUM, in the law of Scotland, is a lump sum paid by persons who take a lease of landed property. In the case of entailed estates, the heir in possession is generally prohibited from taking large sums in the form of a grassum, and letting the property at a lower rent, because it tends to prejudice those who succeed him in the property. In England, the word is not used, but the word premium in some cases, and fine in others, means the same thing. Where a person is entire owner or freeholder, he is entitled to let his land at any rent he pleases, and to stipulate for a grassum as large as he can get.

GRASS VALLEY, a village in Nevada co., Cal., about 50 m. n.n.e. of Sacramento, in the midst of the richest gold mines of the state; pop. 7,063. It is the seat of a Roman Catholic bishop, and has a convent, a number of Protestant churches, and two orphan asylums. Quartz mills and iron foundries are prominent business establishments.

GRASSWRACK, *zostéra,* a genus of plants of the natural order *naiades,* one of the few genera of phanerogamous plants which grow amongst sea-weeds at the bottom of the sea. The leaves are narrow and grass-like; and the flowers consist merely of stamens and pistils, without any perianth, inserted on the central nerve of one side of a flat thin linear *spadix,* with a leafy *spathe.* The pollen is confervoid.—The common grasswrack (*Z. marina*) is a perennial plant, which forms green meadows on the sandy bottom of shallow parts of almost all the European seas, and abounds in creeks and salt-water ditches. It is found in great plenty on the British shores. It becomes white by exposure to the air. The rush-like coverings of Italian liquor-flasks are made of it, and it is much used for packing glass bottles and other brittle ware. It has been long used in Holland, Gothland, and Iceland for stuffing pillows and mattresses, and this use has of late years very much extended, so that the plant has become an article of commerce, under the name *alga marina,* or more commonly, but incorrectly, *alva marina* (Ger. *see-gras*).

GRATE, the iron cage which supports the coal for a common fire. Considerable improvements have been made of late years in the construction of common domestic grates. Our forefathers simply added an iron cage to the old form of fire-place built originally for burning a pile of wood. This was a large square-sided recess, with a very wide opening for the chimney. Count Rumford pointed out the disadvantages of this, and the principles upon which they should be remedied. See CHIMNEY. In the modern grate, the filling up of the square cavity recommended by count Rumford, and also his plan of lowering and narrowing the throat of the chimney, are usually effected by iron plates forming part of the grate. These plates are readily heated, and with equal readiness radiate and reflect the heat into the room, and thereby effect a considerable saving of coal, besides which the grate itself is brought forward level with, or even projecting beyond, the walls of the room, whereby the radiation from the heated coal is utilized to the utmost. One of the most effective as well as elegant forms of grate is that which consists simply of a large square iron plate set nearly flush with the wall, in the middle of which is a hemispherical cavity with bowed bars in front, and a trapped opening into the chimney in the upper part of this cavity. When there is a fair draught, this form of grate gives a good fire, and effects the maximum economy of fuel for an open fire-place (which of course is always somewhat wasteful compared with a stove). The curved surface behind and above the fire radiates and reflects into the room from every part of its surface, and the plate flush with the wall, which is heated by conduction, may be regarded as a part of the room, and thus the main condition of economy is effected, viz., throwing as much as possible of the heat into the room, and allowing as little as possible to go up the chimney. A lining of firebrick or of fireclay, molded to the form of the back of the grate, is useful in retaining the heat which is necessary for complete combustion of coal; the firebrick, being a bad conductor and an excellent radiator, becomes red-hot on its surface next to the coal, and this heat is not carried away, but is radiated into the fire, and assists in burning the carbon of the smoke. The conditions for securing an effective draught are treated under CHIMNEY.

GRA'TIAN, the collector of the well-known body of canon law which is commonly cited under the title of *decretum gratiani.* It is singular, however, that although few authorities have been so frequently cited, or have obtained so wide and permanent acceptance as this celebrated collection, hardly anything is known of the collector's own personal history. The sum of our knowledge regarding him is, that he was a native of Chiusa in Tuscany, and that he became, in later life, a Benedictine monk of the monastery of St. Felix in Bologna. The date commonly assigned to Gratian's collection is 1141 or 1151; its title, however, *decretum,* or *concordia discordantium canon,* is believed to be of later origin. How far the collection is the work of Gratian himself, or how far he was indebted for his materials, and even for their arrangement, to the labors of earlier collectors, it is difficult to determine. The work consists not only of the decrees of councils and popes down to Innocent II. (including the spurious ISIDORIAN DECRETALS, q.v.), but also of passages from the Scripture, from the fathers, and even from the Roman law. It is divided into three parts. The first regards the hierarchical constitution of the church, and chiefly relates to doctrinal and moral subjects. It is divided into "distinctions." The second treats of external jurisdiction, under the head of "causes" and "questions." The third regards the inner life of the church—the liturgy and the sacraments. From what has been already said regarding his adoption of the Isidorian decretals, it will be inferred that in point of criticism Gratian's authority is of little value, and, in general, it may be added that no authority is given to any document beyond what it intrinsically possesses, from the fact of its being placed in Gratian's collection. For the other collectors of the canon law, see CANON LAW. The date of Gratian's death is unknown.

GRATIA'NUS, AUGUSTUS, eldest son of Valentinian I., by his first wife Severa, was born at Sirmium in Pannonia, on April 19, 359 A.D. While he was still *nobilissimus puer* (or heir-apparent), he was created consul, and in 367 was elevated by his father to the rank of Augustus at Ambiani, or Amiens, in Gaul. In the following year he accompanied his father in his expedition against the Alemanni, in order that he might be accustomed to warfare. On the death of Valentinian the troops elevated Gratianus to the throne, giving him at the same time as a colleague his half-brother Valentinian II. Gaul, Spain, and Britain fell to Gratianus's share; and as his brother was only four years old, Gratianus is supposed by many authorities to have been the monarch *de facto* of the rest of the western empire, fixing his residence at Treviri (now *Treves*). During the first part of his reign, a fierce warfare was carried on against the tribes who possessed the Danubian provinces and Illyricum; and he was on the point of marching into Thrace, to assist his uncle Valens against the Goths, when he was suddenly called upon to defend his dominions against the Lentienses, a tribe of the Alemanni. After the invaders had been defeated Gratianus advanced towards the eastern empire, but while on the way, he learned that his uncle Valens had been defeated and killed by the Goths near Adrianople (Aug., 378). The sovereignty of the eastern empire then devolved upon Gratianus, but feeling his inadequacy to the task of ruling the whole empire, he recalled Theodosius (q.v.) from Spain, and appointed him his colleague on Jan. 19, 379. Gratianus possessed some admirable virtues: he was pious, chaste, and temperate; his understanding was well cultivated, although not strong, and his eloquence attractive. But his character was too yielding and pliant, and he was consequently often led to the commission of gross acts of cruelty and tyranny, utterly foreign to his nature. His persecution of the pagans, and afterwards of heretic Christians, made him a great favorite with orthodox ecclesiastics, but rather alienated the affections of his subjects generally, while his fondness for frivolous amusements, and unworthy associates, excited the contempt of the army, so that when Maximus was proclaimed emperor by the legions in Britain, crowds of the disaffected flocked to his standard. Gratianus was defeated by him near Paris, and afterwards fled to Lyons, where he was overtaken and killed by Andragathius, whom Maximus had sent in pursuit of him, on Aug. 25, 383.

GRATIANUS, FRANCISCUS, a monk of Bologna of the 12th century. He is known from a collection of decretals or church canons bearing his name. He is charged with extending the power of the papacy by teaching that the pope himself was not subject to the canons.

GRATI'OLA, a genus of plants of the natural order *scrophularineæ,* having a 5-partite calyx, the upper lip of the corolla bifid, the lower trifid, only two stamens fertile, and the anthers pendulous. *G. officinalis,* sometimes called HEDGE HYSSOP, is found in meadows and on the margins of ponds and river-banks in most parts of Europe, but not in Britain. It has sessile lanceolate serrulated leaves, and axillary solitary flowers. It is extremely bitter, acts violently as a purgative, diuretic, and emetic: and in overdoses is an acrid poison. It is administered in cases of worms, jaundice, dropsy, scrofula, mania, and venereal diseases; but requires to be used with caution. It is said to render some of the Swiss meadows useless as pastures. It was formerly so highly esteemed as a medicine, that the name of *Gratia Dei* (Grace of God) was given to it, and for the same reason it is known in France as *herbe au pauvre homme* (poor man's herb). It is said to be the basis of the famous gout medicine called *eau medicinale.*—*G. peruviana,* a

South American species, has somewhat similar properties. These properties are supposed to depend upon a bitter resinous principle called *gratioline.*

GRATIOT, a co. in central Michigan, intersected by Prairie river, and crossed by the Saginaw Valley and St. Louis railroad; 576 sq.m.; pop. '74, 13,886. It has an undulating surface and much is yet forest land. The soil is fertile. Lumber, hay, wheat, corn, and oats are the principal products. Co. seat, Ithaca.

GRATIOT, CHARLES, 1788—1855, born Mo.; graduated at West Point in 1806, entering the corps of engineers, and was made capt. in 1808. He was chief of engineers under gen. Harrison in 1813-14, and took part in the defense of fort Meigs, April-May, 1813, and the attack on fort Mackinac, Aug. 4, 1814. He was made maj. in 1815, lieut.col. in 1819, col. and chief of engineers in 1828, and the same year brig.gen. by brevet. He was inspector of the academy at West Point, 1828-38. Dec. 6, 1838, he was dismissed from the service.

GRATRY, AUGUSTE JOSEPH ALPHONSE, Abbe, 1805-72; b. France. He was chaplain of a normal school and director of a college in Paris. With others he founded the "oratory of the immaculate conception," a society of priests, devoted particularly to the instruction of the youth of the city. In 1861 he became vicar-general of Orleans, and two years later professor of moral theology in the Sorbonne. About this time he published a *Course of Philosophy.* He afterwards vehemently opposed Renan and the rationalists generally. In 1867 he was made a member of the academy. He favored Pere Hyacinthe for a time, and was censured by his superiors.

GRATTAN, The Right Honorable HENRY, was b. in Dublin July 3, 1746. His father was recorder and M.P. for that city until his death in 1766. The year after that event, having completed his university studies with distinction at Trinity college, Dublin, Grattan entered as a student of law at the Middle Temple, London, where, however, he neglected the pages of Blackstone, to listen to the living oratory of parliament, and in particular of lord Chatham. In 1772 he was called to the Irish bar, and in 1775 was returned to the Irish parliament as representative for the borough of Charlemont, for which he sat until 1790, when he was elected as one of the representatives of the city of Dublin, to such an extent had his patriotism and eloquence recommended him to the Irish people. Mainly to him was owing, among other things, the partial abolition of the heavy restrictions on Irish commerce. But his popularity ebbed as it had flowed (and oftener than once) in the hearts and huzzas of his impulsive and therefore inconstant countrymen. In 1797 he declined to come forward for Dublin, and went into temporary but undeserved eclipse. In 1800 he was returned for the borough of Wicklow, to oppose the union, and that was to fight for the people's idea of the constitution. But the union was effected in spite of him, and in 1805 he was returned to the imperial parliament for the borough of Malton, in Yorkshire. Next year, he was induced to stand for Dublin, and was re-elected. He sat for it in successive parliaments till his death, which happened on June 4, 1820, in London, to which he had gone when in a weak state of health, contrary to the advice of his physicians, to advocate, as he had been wont, the cause of Catholic emancipation.

Grattan's public and private character was unimpeachable. For the vacillations of his popularity in Ireland, his countrymen had reason to be ashamed, and it is certain that he now holds a proper and exalted place in the esteem of the people, for whom he labored with such sincerity, integrity and genius. The history of his life is in great measure the history of the Irish constitution, and entirely the history of the parliament of Ireland. His *Life and Times* was published by his son.

As an orator, he stands in the first rank. His style is full of point, rapidity, antithesis, and poetic suggestiveness. His eulogy on Chatham, and his invective against Bonaparte, are not surpassed in British eloquence. Byron declares him to be an orator—

> With all that Demosthenes wanted, endowed,
> And his rival or master, in all he possessed.

His speeches were published by his son and biographer. A statue of Grattan, on College Green, Dublin, was unveiled in 1876.

GRATTONI, SEVERINO, b. Italy 1816; educated as an engineer, and was consulted by Cavour on the Mont Cenis tunnel and other important works. Grattoni became the head director of the great tunnel which was completed in 1871. He was for a time a member of the Italian chamber of deputies.

GRATUITOUS DEED, in the law of Scotland, means a deed granted without any value received. If it is made in favor of a third party, in order to defeat creditors, it is null and void, by stat. 1621 c. 18. There is this peculiarity, also, that when a person is too generous, and contracts voluntarily to give away property at a future period, if he become destitute in the meantime, the court will, at least where the deed was in favor of children or grandchildren, retain sufficient for his own subsistence. This is in imitation of the Roman law as to *beneficium competentiæ,* but the Roman law went further. Such a provision is wholly unknown in England. In England gratuitous deeds are usually styled gifts (q.v.) or voluntary conveyances (q.v.), according to circumstances.

GRATZ, the capital of the crown-land of Styria, in Austria, is a picturesque old t., built on both sides of the Mur, and encircled by fine gardens and pleasure-grounds. It is 140 m. s.s.w. of Vienna, by the Vienna and Trieste railway. The civil population amounts (1869) to 80,732. The inner town, which is connected with the suburb on the western side of the river by two chain and two wooden bridges, is surrounded by walls and by a promenade (formerly the glacis) shaded with trees, has narrow and crooked streets, and is not remarkable for cleanliness. It is worthy of notice, however, from the number of old buildings which it contains, as the cathedral of St. Agidi, built in the 14th c.; the ancient castle of the Styrian dukes, which possesses many curious relics of antiquity; the Landhaus, where the nobles of the duchy held their meetings; the university, founded in 1585, with its library containing 70,000 volumes; its museum, etc., the arsenal, and various palaces belonging to the Styrian nobility. Grätz is well provided with gymnasia and other public educational establishments for the laity, and seminaries for the clergy. As the seat of government for the circle, Grätz has special courts of law and administration, and is a place of considerable importance. It has important manufactures of steel and iron wares, cotton, linen, and woolen fabrics, leather, paper, saltpeter, etc. From its position on the direct line of railway communication between Vienna and Trieste, it is favorably situated as an intermediary station for the trade of the Austrian capital and the Adriatic provinces. Grätz is the residence of a prince-bishop, and has, besides a Protestant church and a synagogue, 23 Catholic churches, some of them very ancient. The country round about Grätz is singularly beautiful and picturesque.

GRAU'DENZ, an old t. and important fortress of Prussia, in the province of west Prussia, stands on the right bank of the Vistula, 60 m. in direct line s. of Dantzic. A bridge of boats, 2,780 ft. in length, here crosses the river. Grätz contains numerous seminaries and educational establishments. It carries on a trade in corn and tobacco, and manufactures of woolens and cottons, etc. The town is fortified by a wall; and about a m. n. of it on a hill, and in a position that commands the course of the Vistula, is the bomb-proof fortress of Graudenz. Pop. '75, 14,553, including the garrison.

GRAU'WACKE. See GRAYWACKE.

GRAVE CREEK. See MOUNDSVILLE.

GRAVEL, the name given to aggregations of water-worn and rounded fragments of rocks, varying in size from a pea to a hen's egg. When the fragments are smaller, the deposit is sand; when larger, it is called shingle. Beds of gravel occur in formations of every age. While the materials have been a long time in being prepared, and have traveled perhaps a great distance from the mother-rock, gravel deposits have been formed speedily and by the action of a strong current of water. They form very irregular and limited deposits, occurring generally as banks or hummocks in strata of sand. Unless in the most recent deposits, they almost always form a hard rock called conglomerate or puddingstone, the pebbles being compacted together by some infiltered current, which is most frequently iron, lime, or silex. Even so recent as the glacial period, gravels are sometimes formed into a compact concrete, though these and later deposits are generally loose. Mr. Prestwich has divided the pleistocene gravels into "High Level" and "Low Level Gravels." The high level gravels are the more ancient; they have been deposited subsequently to the formation of the present valleys, but apparently at a time when there was much more water in the valleys than there is now. The low level gravels have been produced by the present rivers.

GRAVEL. See CALCULUS.

GRAVELINES, a small fortified t. and seaport of France, in the department of Nord, is situated in a marshy locality at the mouth of the Aa, 12 m. s.w. of Dunkerque. Although now a desolate-looking t. with grass growing in its streets, it is of importance in a historical point of view. Here the count d'Egmont obtained a victory over the French army commanded by the Marechal de Thermes in 1558; a victory which compelled the French to accept the severe conditions of the peace of Cateau-Cambrésis. Ten years later, it was taken by Louis XIV., who had it fortified by Vauban. The inhabitants are employed chiefly in the herring and cod fisheries, and the trade in liquors, timber, salt-fish, etc. The harbor has now become useless from neglect. Pop., with garrison, '76, 4,182.

GRAVELOTTE, BATTLE OF, was fought Aug, 18, 1870, in the Franco-German war, near the village of Gravelotte in Alsace-Lorraine. The first and second German armies under gen. Steinmetz and prince Frederick Charles with king William as commander-in-chief, gained a great victory over the French forces under marshal Bazaine. This battle decided the fate of Metz and was probably the bloodiest of the whole war. The Germans numbering 211,000 lost 904 officers and 19,658 men; the French numbering 140,000 lost 609 officers and 11,605 men.

GRAVEL WALLS, made of a conglomeration of cement, or lime, and pebbles and small stones or slag. They are built in casings and the planks may be taken away after the mass has properly hardened. Apertures for doors and windows should be made while the wall is in process of building.

GRAVES, a co. in w. Kentucky on Clark's river, traversed by the Paducah and Memphis railroad; 515 sq.m.; pop. '70, 19,398—2,329 colored. The region is level and the soil productive; chief productions, wheat, corn, tobacco, cotton, and butter. Co. seat, Mayfield.

GRAVE ROBBING. The offense of taking up dead bodies has often been attempted to be declared felony by act of parliament; but it is only a misdemeanor, punishable by fine and imprisonment. If, however, the shroud, coffin, or any property in the nature of a chattel is taken away from the grave, the party may be indicted for felony in stealing these. See ANATOMY (in Law).

GRAVESEND, a market-town, municipal borough, and river-port of England, in the co. of Kent, is situated on the right bank of the Thames, 33 m. w.n.w. of Canterbury, and 24 m. e.s.e. of London by the North Kent Railway. It occupies a somewhat commanding position on the first rising ground after entering the river; and consists of the old town, with narrow, inconvenient, and not too cleanly streets, and of the new town, w. of the older portion, with handsome streets, squares, and terraces. Gravesend is not famous for its architecture. In the vicinity are extensive market-gardens, great part of the produce of which is sent to London. Many of the inhabitants are employed in fishing. Gravesend forms the limit of the port of London. Here pilots and custom-house officers are taken on board of vessels going up the river. For centuries the prosperity of the town has depended on its connection with the metropolis. The salubrious air and beautiful scenery at Gravesend render it a favorite watering-place with Londoners. It carries on some ship-building and a considerable trade in supplying ships' stores. Pop. of municipal borough '71, 21,260; of parliamentary borough, 27,493.

Gravesend was originally a *hythe,* or landing-place, and is mentioned as such in Domesday. Around this landing-place a town grew up soon after the conquest. Here the fleets of the early voyagers, as that of Sebastian Cabot in 1553, and of Martin Frobisher in 1576, used to assemble; and here the lord mayor, aldermen, and city companies were wont to receive all strangers of eminence, and to conduct them up the river in state, forming processions, which, says the historian Froude, were "spectacles scarcely rivaled in gorgeousness by the world-famous weddings of the Adriatic."

GRAVE STONES. The right to grant or refuse permission to erect grave stones, tombs, or monuments in the church or church-yard, in England, is vested in the ordinary, who is generally the bishop. In Scotland, a similar power is vested in the heritors, i.e., the proprietors of the lands in the parish.

GRAVIER, JACQUES, d. 1708; a French missionary in Canada and the wilds of Illinois in the latter part of the 17th century. He continued the work of Marquette among the Indians for several years, but was constantly opposed by the medicine men who found their craft in danger. At length they gave him a wound from which he never recovered. During his labors he went down the Mississippi twice to see Iberville, the Louisiana pioneer. He sailed for Europe in 1706, and returned in 1708. He wrote three works on the Indian missions and Louisiana affairs, and compiled a grammar of the Illinois tongue.

GRAVINA, a commercial and industrious episcopal t. in the s. of Italy, in the province of Bari, is situated on a hill above the left bank of a stream of the same name, 37 m. s.w. of the town of Bari. It contains (1872) 14,194 inhabitants, and occupies the site of ancient *Blera,* one of the stations on the Via Appia, which passed at Poggio Orsino, about a mile from the town. In 995 it sustained a memorable siege against the Saracens. It was a favorite hunting-place of the emperor Frederick II. The neighborhood possesses rich pastures, and raises a celebrated breed of horses, in which the inhabitants do a large trade at their annual cattle-fair.

GRAVITA, an Italian term used in music, signifying that it is to be performed with an earnest and dignified expression, while the movement progresses in a slow, marked, and solemn time.

GRAVITATION—GRAVITY. All bodies, when raised into the air, and left unsupported, fall to the earth in lines perpendicular to it. The force which causes them to do so is termed gravity, and, universal experience shows, acts towards the earth's center; more strictly, it acts perpendicularly to the surface of still water. But if a body, as a stone, be projected obliquely into the air, it is made to describe a curved path, having a highest point, vertex, or apogee; and when it meets the earth in its descent, its direction is not towards the center, but inclined to it at the angle of projection. See PROJECTILES. Observing this, and that the body, if not interrupted by the earth's surface, would continue to move in a curve, with its tangent always away from the center, it is easy to imagine that if not interrupted, it might circulate round the center as the moon does round the earth. Next, knowing that the force of gravity is exerted at all accessible heights above the earth, the question arises—May it not be exerted as far off as the moon? which we know to influenced by *some* force which continually deflects her from the tangent to her orbit, and makes her circulate round the earth. See CENTRAL FORCES. Observing now the time of revolution of the moon, and calculating its centrifugal force, which we know must equal the centripetal force, we put the question: Is this force the same as gravity? The answer is, that it is a force

3,600 times less energetic. If, then, gravity be the force which really holds the moon to her path, it must be explained why it acts upon her so much more feebly than it would, were she a body on the earth's surface. The explanation is given at once if we suppose gravity to be a force whose energy diminishes with increase of distance, and is inversely as the squares of the distances at which it is exerted, for the distance of the moon from the earth's center is just about 60 times that of the earth's surface from its center, and $3,600 : 1 :: 60^2 : 1$. We infer that it does so from the fact, that there is nothing inadmissible in such a diminution of energy with increase of distance—that, on the contrary, there are many analogies for it, as in the emanations of light and heat; and in the argument drawn from the necessity of otherwise supposing some other force than gravity to be employed in deflecting the moon, and the force of gravity to cease at some unknown level. On these views, and a generalization to be afterwards mentioned, Newton is understood to have at first rested his law of universal gravitation: "Every particle of matter in the universe attracts every other particle with a force directly proportioned to the mass of the attracting particle, and inversely to the square of the distance between them"—a law, the truth of which, since it was first broached, has been put beyond all question by the most complete body of predictions, fulfilled to the letter, that can be cited in support of any law of nature.

Before, however, the argument on the extension of terrestrial gravity to the sphere of the moon could have become pregnant with so great a result, much investigation had to take place in other fields; and, in fact, Newton had, previously to conceiving the law, explained the three great Keplerian laws of order obtaining in the solar system by reference to an attractive force residing in the sun. These laws are—1. That the planets revolve round the sun in ellipses, having the sun for a common focus: 2. That every planet moves in such a way that the line drawn from it to the sun sweeps over equal areas in equal times: 3. That the squares of the times occupied by the several planets in their revolutions in their elliptic orbits, are proportional to the cubes of their mean distances from their common focus, the sun. From the law of equal areas, Newton inferred that every planet is retained in its orbit by a force of attraction directed towards the center of the sun; from the orbits being elliptical, he inferred that in each case this force varies in intensity according to the inverse square of the body's distance from the sun; while from the third law he inferred the homogeneity of the central force throughout the solar system. It was then, after being familiar with the notion of terrestrial gravity, and its action, through the researches of Galileo, Huyghens, and Hooke, and with the notion of a central force acting inversely as the square of the distance of its object, through his explanations of the laws of Kepler, that he put to himself the question: Is not the force with which the moon gravitates to the earth the same with gravity?—the force which causes a stone to fall on its surface. A question answered affirmatively on the supposition of gravity, like the sun's attraction, being a force diminishing with increase of distance, and according to the same law. The result was to bring the whole solar system, the planets and the sun, and satellites and their planets—the satellites being observed to obey the same laws of order with reference to their primaries that the latter obeyed in reference to the sun—under the law of gravitation. And the imagination lifted up by the grandeur of the conception, would refuse to limit the operation of that law to our own system, were there no facts to entitle us to extend it beyond. The phenomena of double stars, however, of themselves justify the extension and the statement of the law as we have given it in universal terms. It may be observed, in conclusion, that the Keplerian laws, which may be said to have been the basis of Newton's researches, are, owing to perturbations caused by the mutual action of the planets, etc., only approximately correct; and that these perturbations afford, when examined, a further proof of the truth and universality of the law of gravitation.

For a notice of speculations as to the nature of the law of gravitation, see FORCE; see also FALLING BODIES, PROJECTILES, etc.

GRAVITY, SPECIFIC. See SPECIFIC GRAVITY.

GRAY, a small t. of France, in the department of Haute-Saône, is situated on the slope of a hill overlooking a beautiful meadow, on the left bank of the Saône, 26 m. w.n.w. of the Besançon. It is commanded by the remains of an ancient castle, the residence in former times of the dukes of Burgundy, and has a pleasing appearance from a distance, although its streets are crooked, narrow, and steep. Gray is an important entrepôt for goods from the north-eastern districts of France, which are conveyed by the Saône to the south. Its trade is chiefly in corn, flour, timber, wine, iron, and colonial produce. Pop. '76, 7,345.

GRAY, ASA, an eminent American botanist, b. at Paris, Oneida co., N. Y., Nov. 18, 1810. He took his degree of M.D. in 1831, but soon relinquishing the practice of medicine, he devoted himself, under prof. Torrey, to his favorite study of botany. In 1834 he received the appointment of botanist of the United States' exploring expedition; but as a long delay took place before it was ready to sail, he resigned his post in 1837. He was afterwards appointed prof. of botany in the university of Michigan; but before he had entered upon the duties of that office he was elected, in 1842, Fisher prof. of natural history at Harvard university, Cambridge, Mass. In addition to his prelections at Cambridge, prof. Gray has delivered some courses of lectures at the Lowell institute, in Bos-

ton. He ranks among the leading botanists, not only of America, but of the age. In his numerous writings he has shown equal ability in communicating elementary knowledge and in elucidating recondite theories. He came forward at a time when the old artificial systems of botany were giving way to the natural system which has taken their place, and he was the first in America, in conjunction with Dr. Torrey, who arranged the heterogeneous assemblage of species upon the natural basis of affinity. In 1836 he published his *Elements of Botany*, afterwards enlarged into the *Botanical Text-book;* and in 1838 he commenced, with Dr. Torrey, the *Flora of North America*, to be completed in three large volumes, but still unfinished. In 1848, appeared the *Manual of Botany for the Northern United States*, and the first volume of the *Genera Borealia Americana Illustrata*, of which another volume has since been issued. Among his remaining works may be mentioned: *Botany of the United States' Pacific Exploring Expedition, under Captain Wilkie* (1854–58); *How Plants Grow; Lessons in Botany; Structural and Systematic Botany;* a revised edition of the *Botanical Text-book*, with 1300 illustrations; *Flora of the Southern United States; School and Field Book of Botany* (1869); and *Botany for Young People* (1869). Prof. Gray has also contributed many papers to scientific periodicals and the transactions of learned societies.

GRAY, DAVID, 1838–61; a poet of Scotland, the son of a poor weaver. David managed to get into Glasgow university, and acquired a fair education. He was for a time private tutor. In 1860 he went to London, where from motives of economy he slept the first night in a park and laid the foundation of the disease from which he died. He had written *The Luggie*, an intensely Scotch poem; but no one felt inclined to read it. Finally Monkton Milnes took pity on him and tried to get the poem into Thackeray's magazine, but the editor rejected it. The sick and disappointed author was sent home by Milnes, and the day before he died he had the satisfaction of seeing a proof-sheet of the first pages of his *Luggie*, which, through Sidney Dobell's influence, had found a publisher. The work, including other poems, was published in London in 1862.

GRAY, FRANCIS CALLEY, LL.D., 1790–1856; b. Mass.; graduated at Harvard, and became a lawyer. When John Quincy Adams was envoy to Russia, Gray was his private secretary. He was a member of the Massachusetts legislature. He took great interest in science, and was secretary of the academy of arts and sciences. In his will he left $50,000 for a museum of comparative zoology to be a part of Harvard university, besides an investment to secure care of the museum and publication of catalogues and illustrations. In 1848 he published *Prison Discipline*, and from time to time contributed many papers to the *North American Review*.

GRAY, GEORGE ROBERT, b. England, 1808; brother of John Edward (*ante*), and also a naturalist. He was 28 years in the zoological department of the British museum, and has written many papers and some books on natural history, among them the article on entomology in Cuvier's *Animal Kingdom*, *List of the Genera of Birds*, and two others also on birds. His list embraces over 2,900 genera and 11,660 species.

GRAY, HENRY PETERS, 1819–79; b. New York; studied painting with Huntington, and in 1839 traveled in Europe. While there he produced "Thou art Gone;" "The Billet Doux;" and "The Roman Girl." He returned in 1843, but was again in Europe in 1845–46, when he painted "Teaching a Child to Pray;" "Proserpine and Bacchus;" and other works. Some of his more important pictures are "Wages of War;" "Apple of Discord;" "Portia and Bassanio;" "Cleopatra;" "Origin of the American Flag;" and "Genevieve." In 1871 he went to Europe where he remained several years, after which he returned to New York, where he died.

GRAY, JOHN EDWARD, naturalist, b. at Walsall in the year 1800, was educated for the medical profession. In 1821 he assisted his father (who was author of *Supplement to the Pharmacopœia*, and other works) in the preparation of his *Natural Arrangement of British Plants*, in which, for the first time in the English language, the new method was adopted. In 1824 he entered the British museum as assistant in the natural history department, where he found scope for the employment of his extensive knowledge and accuracy of observation, and in 1840 was appointed keeper of the zoological collections. This important post he retained till his death, to the manifest advantage of zoological science, for the British museum collections are the most complete in the world: a monument of his persevering activity throughout an active life. His success was partly due to his quickness in seizing the peculiar characteristic of animal forms, which rendered him a good classifier. The royal Bavarian academy of sciences at Munich recognized his services to science by conferring on him the title of PH.D. Dr. Gray wrote much on subjects connected with his department. The mere titles of his books and papers make a long list, numbering more than 500. His zoological and natural history catalogues are not mere lists, but are enriched with synonyms and ample notes, whereby study of particular subjects is greatly promoted. Dr. Gray did not confine his activity to his special department: he assisted in the formation of some of the most prosperous scientific societies of London: and he was a vice-president of the zoological society, and took an active part in its management. He, moreover, claimed to have anticipated sir Rowland Hill in his proposal for a low uniform rate of postage. He, at various times, gave valuable evidence before parliamentary committees, on the management of the

British museum and other subjects; and he served on the juries of the great exhibitions of 1851 and 1862. Dr. Gray died at his residence in the British museum, in 1875.

Dr. Gray's principal works are: *Illustrations of Indian Zoology*, 2. vols. folio; *The Knowsley Menagerie*, 2 vols. folio; *Spicilegia Zoologica—on Mammalia, Birds, Reptiles, Fishes, Mollusca, Shells;* a *Synopsis of the Contents of the British Museum;* besides catalogues of the specimens in the zoological department, which have greatly facilitated the study of those collections. He also wrote many scientific papers, which have been published in the *Philosophical Transactions*, the *Transactions of the Linnæan Society*, the *Encyclopædia Metropolitana*, *Annals of Natural History*, and the *Reports of the British Association;* the whole comprising a mass of facts and principles highly valuable to naturalists.

In 1826 Dr, Gray married a lady who rendered him important aid in his studies, and is known as authoress of *Figures of Molluscous Animals, for the Use of Students*, a work in five volumes. In 1832 he was elected a fellow of the royal society, and afterwards served on the council. He was a member of some of the principal societies and academies in England and on the continent.—His late brother, GEORGE R. GRAY, who was an officer in the zoological department of the British museum from 1831 till his death in 1872, was the author of many memoirs on zoology, but is best known as author of *The Genera of Birds.*

GRAY, ROBERT, 1755–1806; b. R. I. He was the first to carry the American flag around the world, which he did in 1790–91 in the sloop Washington on a trading voyage to the n.w. coast of America and on to China and the west. On another voyage in 1791 he discovered the Columbia river (in Oregon).

GRAY, THOMAS, an English poet, was b. in London Dec. 26, 1716. His father, Philip Gray, a money-scrivener, was of a disposition so violent, that his wife was obliged to separate from him; and it was mainly through her exertions that her son was placed at Eton, and afterwards at Cambridge. At Eton he made the acquaintance of Horace Walpole, the son of the prime minister; and when his college education was completed, he accompanied his friend on a tour through France and Italy. After spending a year in the search of the picturesque and in the exploration of picture-galleries, the friends quarreled, and Gray returned to England, and went to Cambridge to take his degree in civil law. At the university the greater portion of his life was spent breathing the serene air of noble libraries, and corresponding with friends, as only the men of that day could correspond. In 1756, in consequence of a practical joke, he removed from St. Peter's college to Pembroke hall. He had a just appreciation of the natural beauty of his native country, and rambled in Scotland, Wales, and the English lake counties. He made notes wherever he went, and wrote copious descriptions of what he had seen to his literary friends. He published his *Ode to Eton College* in 1747, and his *Elegy written in a Country Churchyard* two years afterwards. His *Pindaric Odes* appeared in 1757; but however much they might dazzle the imagination with brilliant imagery, and charm the ear with involved and intricate harmony, they did not touch the popular heart like the *Elegy*. On the death of Colley Cibber, he was offered, but declined, the post of poet-laureate. Shortly after, he was appointed professor of modern history. Fastidious in his tastes, fond of books and lettered ease, indisposed to mingle in the great world, but delighting to comment upon it in letters to friends, blessed with a reputation peculiarly dear to a scholar's heart, comparatively rich, his life glided on imbittered but by one enemy—gout. Dining one day in the college hall, he was severely attacked, and after suffering a week, he died July 30, 1771, aged 55 years. He was buried by the side of his mother at Stokes near Eton.

The poetry of Gray, with the exception of the *Elegy*—which everybody knows—has never become popular; yet in its own sphere it is very perfect; delicately if not richly imaginative, curiously studded with imagery; exquisitely finished, like miniatures painted on ivory. But his subjects are often remote, and out of the track of ordinary human feelings.

GRAY, in heraldry, signifies a badger.

GRAY, WILLIAM, 1750–1825; b. Mass.; for many years one of the foremost of Boston merchants, a man of little education but of remarkable natural abilities. At one time he had more than two score large vessels engaged in ocean trade. He was a member of the state senate, and for one term lieutenant-governor. Many anecdotes are current of his oddities and his utter indifference to the personal pride that usually accompanies great wealth.

GRAYLING (*thymallus vulgaris*), a fish of the family *salmonidæ*, and of a genus distinguished from salmon, trout, etc., by smaller mouth and much smaller teeth, and by the greater size of the dorsal fin. The scales are also much larger. The grayling is found in many streams in England, but is, however, very local; and of two rivers in the same neighborhood, one often contains it, and the other does not. A supposition that it was brought to England by the monks, is unsupported by any evidence. It is found in the Eden and the Esk in Cumberland, in the Clyde in Lanarkshire, and in the Orkney islands. It is plentiful in many parts of Europe, and equally in Switzerland and in Lapland. It inhabits clear streams, with rocky or gravelly bottoms, and "seems

to require an alteration of stream and pool." It will live in clean newly-made ponds in hard soil, although it does not breed in them, but will not live in those of muddy bottom. Its food consists chiefly of flies and aquatic larvæ, and it is taken by angling in the same manner as the trout. It sometimes attains the weight of 4 or 5 lbs. The back and sides are silvery gray, marked with numerous longitudinal dusky streaks; the dorsal fin is spotted, the spots arranged in lines across the fin. The abdominal line is almost straight, the dorsal line is considerably elevated. The grayling is greatly esteemed for the table, but requires to be cooked when newly caught, when it has an odor which has been compared to that of wild thyme. It spawns in April or May, and is in the best condition when trout are out of season, in Oct. and Nov.—There are several other species of *thymallus*, none of which are British. One of them, *T. signifer*, a very beautiful fish, inhabiting the clear affluents of the Mackenzie river, is called *hewlukpowak*, or the *fish with the winglike fin*, by the Esquimaux. It is said to afford excellent sport to the angler; although the streams in which it is found are visited by few anglers for mere amusement.

This beautiful fish is very local in its distribution, but is abundant in most of the Scandinavian rivers. Angling for grayling is excellent sport. It rises to the same flies as those which are used for trout: it also takes worms, maggots, and other small larvæ and insects. From July to the end of Oct. are the best months for grayling fishing, but in fine open days they afford sport through the winter.

GRAY'S INN, one of the four inns of court having the sole power of calling persons to the degree of barrister-at-law. See INNS OF COURT.

GRAYSON, a co. in w. central Kentucky, drained by head waters of Green river, and crossed by the Louisville, Paducah and Southern railroad; 650 sq.m.; pop. '70, 11,580—407 colored. The surface is nearly level with tolerably fertile soil. Chief productions, corn, tobacco, and pork. Limestone is found in abundance. Co. seat, Leitchfield.

GRAYSON, a co. in n. Texas on Red and Trinity rivers, intersected by the Houston and Texas Central railroad; 950 sq.m.; pop. '70, 14,387—2,145 colored. It has an undulating surface in part covered with forests of ash, oak, etc. The soil is fertile; chief productions, corn, cotton, oats, cattle, and pork. Co. seat, Sherman.

GRAYSON, WILLIAM, b. Va.; d. 1790. He was educated at Oxford (Eng.) and in law in the temple in London. Migrating to Virginia, he became one of Washington's aids; subsequently commanded a Virginian regiment, and was on various commissions with regard to prisoners. He was in the Virginia convention to consider the federal constitution and (with Patrick Henry and others) vigorously opposed its adoption. He was one of the first U. S. senators from the state.

GRAYSON, a co in s.w. Virginia, on the North Carolina border; intersected by the Kanawha river; 400 sq.m.; pop. '70, 9,587—754 colored. The surface is hilly and about one-half is occupied by forests. The main productions are wheat, rye, corn, butter, wool, and cattle. Co. seat, Independence.

GRAY'S PEAK, one of the Rocky mountains in Colorado about 12 m. w. of Georgetown. Its height is 14,466 feet. It was named after prof. Asa Gray, the botanist. Not far away is Torrey's peak of almost the same height, named from prof. John Torrey, the botanist.

GRAZALE'MA, a small t. of Spain, in the province of Cadiz, and situated about 60 m. e.n.e. of the city of that name in a strong position on a rocky hill approachable only by a narrow and easily defended ledge, between the Sierra de Ronda on the e., and the Cerro de S. Cristoval on the west. It was compared by the French (a whole division of whom was here repulsed by the inhabitants) to a land Gibraltar. A great deal of smuggling, and, it is suspected, robbery, is carried on by the inhabitants. Pop. 5,000.

GRAZIO'SO, an Italian term in music, meaning with graceful expression.

GREASE, a term of general application to all oily or fatty matters, but generally to those having some degree of solidity, as tallow. It is more specially applied to fatty matters which are so deteriorated with dirt or other impurities as to be unfit for candle-making and other manufactures requiring some degree of purity in the material. Grease is largely employed as a lubricant for machinery, and especially for the wheels of carriages. The grease employed for the axles of carriages and carts consists of the most inferior kinds of grease mixed with a little tar.

In commerce, the term mares' grease is now well known. It is the fat of horses which are killed in large numbers at Buenos Ayres and Montevideo; and their products, consisting of hides, grease, bones, and hair, are largely exported to this and other countries. Owing to the practice of slaughtering the mares chiefly, this particular kind of fat has been designated *mares' grease*. It is a very oily fat, and so penetrating, that it is difficult to make casks sufficiently tight to prevent leakage. It is used for lubricating machinery, for which it is well adapted.

RAILWAY GREASE is, in reality, a kind of soap, a small portion of soda being mingled with the materials to effect an imperfect saponification. The object is to prevent the

too rapid melting of the material, which, without this precaution, would be excessively rapid, owing to the heat caused by the friction of wheels revolving with such rapidity. It is also made of very superior materials, and consists generally of the vegetable fats called cocoa-nut oil and palm-oil; sometimes animal fat is used. This composition is placed in small metal boxes on the axles, with which they communicate by a small hole, so that, as the axle heats the surrounding parts, the grease in the boxes melts, and runs through the little orifice on to the axle. See BEARS, GREACE.

GREASE. Various kinds of tallow, fat, dripping, and kitchen-stuff receive the general name of grease, as applied to several manufacturing processes; but the name is now more technically given to the lubricating unguent employed for the rolling-stock of railway companies. While oil is the lubricator for the delicate parts of the locomotive, grease is necessary for the axles of the wheels. So vast is the quantity used, that the annual demand amounts to thousands of tons; and, as the quality is very important, most of the great companies make their own—establishing a marked distinction between the two kinds used for locomotives and for wagons.

Locomotive grease usually consists of tallow, oil, carbonate of soda, and water. Much depends on the consistency. If the grease is too thick, the axle-boxes become hot; if too thin, it is used up too quickly. Again, if there is too much alkali, there is a residue left in the boxes; if too little, the grease is too soft and wasteful. The grease is always yellow; but it is made of a thinner consistency for cold weather than for hot. The following are given as the constituents of two kinds that meet with approval, to produce one ton of each kind of grease, allowing a certain percentage for waste:

	WINTER.			SUMMER.		
	cwts.	qrs.	lbs.	cwts.	qrs.	lbs.
Tallow	3	3	0	4	2	0
Palm-oil	2	2	0	2	2	0
Sperm-oil	0	1	7	0	0	27
Alkali	1	0	14	1	0	8
Water	12	3	12	13	0	26

The manufacture is very simple. The tallow and oils are heated to 180° F.; the water and alkali to 200°; both are run off into wooden tubs, where they are well stirred till cold, with special precautions against the admission of any grit or dirt.

Wagon grease is coarser and cheaper in quality. The ingredients are chiefly some kind of resinous oil and caustic lime. When resin was cheap, wagon grease cost about half the price of locomotive grease, and was useful not only for wagon and carriage axles, but also for low-speed goods and mineral locomotives; but during the American war, the price of resin rose, and then attempts were made to use residues from paraffine, coal-tar, candle-making, cotton-seed oil, fish-oil, pitch-oil, and other substitutes.

It is said that 3,000 tons of grease are made every year in the Tyne district, not exactly as a primary product, but as using up a residue from the distillation of resin.

GREASE-WOOD, a plant growing profusely in the w. portion of the United States. Its botanical name is *sarcobatus vermiculatus*. It is most prolific on barren and alkaline soils.

GREAT BARRINGTON, a t. in Berkshire co., Mass., on the Housatonic river and railroad, 40 m. s.s.e. of Albany, N. Y., in the midst of a picturesque region; pop. '80, 4,658. There is water power, and a number of important manufactures. Beds of iron ore and marble are found in the township. Its schools are numerous and excellent. The new town hall is a fine building, before which is a fine statue of Victory for the soldiers' monument. In the vicinity is a curious rock formation called purgatory.

GREAT BASIN, or FREMONT'S BASIN, a remarkable tract of country in North America, lying in the w. of Utah territory, and bounded on the w. by the Sierra de Nevada, and on the e. by the Wahsatch mountains. It is said to be 500 m. in extent from e. to w. and about 350 from n. to s.; is girdled round on every side by high mountains, while detached groups cross its whole area; and lies at an elevation of about 5,000 ft. above sea-level. The Humboldt river mountains, with an elevation of from 5,000 to 7,000 ft. above the surrounding country, traverse the plateau near its center. This basin contains many lakes and rivers whose waters never reach the ocean, but are either taken up by evaporation, or are lost in the more arid districts. The Great Basin is essentially a desert. Some portions of it are covered by a yielding mass composed of sand, salt, and clay; others by a crust of alkaline and saline substance.

GREAT BEAR LAKE. See BEAR LAKE, GREAT.

GREAT BRITAIN. Under this head are noticed—1. The island of Great Britain—its geology and geography; 2. The United Kingdom of Great Britain and Ireland—its general statistics, etc. Historical sketches of England and Scotland down to the union of the two kingdoms are given under their respective names; the history of Ireland to its union with Great Britain is also given under its own name, together with its geography.

The ISLAND OF GREAT BRITAIN—so called to distinguish it from Britannia Minor, or Little Britain (see BRETAGNE) in France—lies between lat. 49° 57′ 30″ and 58° 40′

24° n., and between long. 1° 46' e. and 6° 13' w., and is the largest island in Europe. It is bounded on the n. by the Atlantic, on the e. by the North sea, on the s. by the English channel, and on the w. by the Atlantic, the Irish sea, and St. George's channel. The most northerly point is Dunnet head, in Caithness; the most southerly, Lizard point, in Cornwall; the most easterly, Lowestoft Ness, in Suffolk; and the most westerly, Ardnamurchan point, in Argyleshire. Its greatest length is about 608 m., and its greatest breadth (from Land's End to the e. coast of Kent) about 320 m.; while its surface contains about 89,600 sq. miles.

Geology.—The geology of Great Britain is of peculiar importance. The rocks of the earth's crust having been first systematically studied and expounded here, British geologists have given to the world the names whereby the various strata are known, and British rocks form the typical series of the earth's strata. The whole recognized series of stratified deposits occur in Britain, one or two only being more fully developed elsewhere; and it is only in these singular cases that the foreign equivalents are taken as the types. British geology is no less important from the influence it has had in the development of the country. The mineral wealth, especially the coal and the iron, are the real sinews and muscles of Britain's mighty power. No other country has similar advantages in such an area.

We shall, in this sketch of the distribution of the British rocks, follow the order of the strata, beginning with the lowest and oldest. It may be said that, in general, the mountainous regions of the n. and w. are formed of the oldest sedimentary rocks, and that, as we move south-eastwards, we gradually pass over newer strata, until, in the e. of England, we come to the only extensive Pleistocene deposits in the country.

The base rocks of the whole series occur in the outer Hebrides, in Tiree and Coll, and along the western shores of Sutherland and Ross. The true position of these strata has been only recently determined by Murchison and Geikie, who, noticing that their strike was at right angles to the beds resting above them, discovered that they were older than the superimposed Cambrian rocks. They consider them to be the equivalents of the *Laurentian system*, described by sir W. Logan in Canada. The predominant rock is crystalline gneiss. A band of limestone occurs on the n.e. shore of loch Maree, but this has hitherto proved unfossiliferous.

Resting on the convoluted edges of this old gneiss, on the mainland, and forming the basement rocks in Cumberland, Anglesey, and North Wales, we have the *Cambrian series* of deposits. In Scotland, these rocks are brownish-red sandstones and conglomerates; in England and Wales, they are composed of sandstones, gritstones, and slates. A few fossils, chiefly impressions of supposed fucoid plants, annelid tracks, and zoophytes, have been found in the slates.

The *Silurian measures* occupy a large portion of the surface of the country. The typical rocks occur in Wales, extending over the western portion of the principality from Pembroke to Denbigh, and including the northern portions of Pembroke, Caermarthen, and Brecknock, the whole of Radnor and Montgomery, the s.w. of Denbigh, and the whole of the counties to the west. The oldest or lower silurian beds are next the coast. The series consists of an immense thickness of shales, slates, and sandstones, with intercalated limestones more or less pure. Immense tracts have hitherto proved devoid of fossils; in other districts, the calcareous rocks are almost entirely composed of the remains of marine invertebrate animals, while the shales abound in zoophytes and crustacea. The high lands in the n. of Lancashire and s. of Westmoreland are silurian; but it is in Scotland where these strata are most extensively developed; indeed, almost the whole country consists of silurian strata, with the exception of a large trough in the center, occupied with newer rocks. A line drawn from Dunbar to Girvan forms the northern limit of these beds in the s. of Scotland. Except the lower half of the valley of the Tweed, the whole region from this line to near the base of the Cheviots is silurian. The rocks are chiefly graywacke, with scattered beds of impure limestone. The chief fossils are graptolites, crustacea, and mollusca. The lead-mines of Wanlockhead and Leadhills are in this district. A line drawn from Stonehaven to Helensburgh would mark the termination of the silurian strata, which compose the whole of the n. of Scotland, with the exception of the newer beds on the n.e. coast, and the Laurentian and Cambrian series already described. All the series is greatly metamorphosed; the lower strata are converted into quartzose flagstones and quartz rock, the upper into chlorite and mica-slate, and quartzose and gneissose rocks.

The *old red sandstone strata*, consisting of conglomerates, coarse and fine grained sandstones, and dark-colored schists, with the characteristic fossils of ganoid and placoid fish, overlie the silurians in several districts in Scotland. Nearly all Caithness and the seaward portions of Sutherland, Ross, Cromarty, Inverness, Nairn, and Moray, belong to these strata. A broad band, rising on the e. coast between Stonehaven and St. Andrews, stretches across the country to Helensburgh and Dumbarton on the west. The same strata appear again in Haddington, Berwick, and Roxburgh, in Lanark, and in Ayrshire. An extensive tract of these strata occurs in South Wales and the neighboring English counties, extending from the Silurian district to the Severn and the Bristol channel, and containing in a large basin the South Wales coal-field. The highly fossiliferous strata of North Devon, and of South Devon and Cornwall, belong to this

period. They consist of slates, sandstones, and limestones, and contain numerous corals and shell-fish.

The strata of the *carboniferous period* may be said to occupy a broad tract extending from the Bristol channel to the base of the Cheviots. They are not continuous between these limits, but are broken up in some places by the appearance on the surface of older strata, while in others they are covered by newer deposits. The various detached coal-fields are—(1) the South Wales, in Glamorgan and Pembroke; (2) the Bristol, and (3) the Forest of Dean, in Gloucester; (4) the Forest of Wyre, in Worcester; (5) Shrewsbury, and (6) Colebrook Dale, in Shropshire; (7) North and (8) South Staffordshire; (9) Warwickshire; (10) Leicestershire; (11) Flint and Denbigh; (12) Lancashire; (13) York and Derby; (14) Cumberland; and (15) Northumberland and Durham. In the northern portion of this great tract of coal measures, where the millstone grit and carboniferous limestone are largely developed, no seams of coal of any value are contained. The limestone in Derby is rich in metallic ores. The carboniferous strata of the n. of England extend beyond the Cheviots into Scotland, forming a narrow band from the Solway to the North sea, in the counties of Dumfries, Roxburgh, and Berwick. The only coal-field in this district is one of small extent at Canonbie, in Dumfriesshire. The carboniferous strata in Scotland, with the exception just stated, are confined to the immense trough between the Silurian measures on the s. and the old red sandstone on the n., which is completely occupied by them, except where the old red sandstone rises to the surface. Considerable tracts of sandstone and limestone without coal break up the true coal-bearing measures into the following coal-fields: the Mid-Lothian, the Fife, the Lanark and Stirling, and the Old Cumnock, in Ayrshire. Besides coal, the whole of the carboniferous series contain immense stores of argillaceous carbonate of iron, the ore from which is produced the great bulk of the iron used in the country. The sandstones of this period form beautiful and durable building-stones, the limestones are of great commercial value, and many of the less indurated shales are good fireclays.

Permian strata, consisting of magnesian limestone and sandstone colored with oxide of iron, occupy a considerable area in Durham, and border the carboniferous rocks in Dumfries, Cumberland, Westmoreland, Lancashire, Cheshire, Shropshire, Stafford, Worcester, Warwick, Nottingham, and York, and in Glamorgan. The sandstone is quarried for building.

The typical triple series of the *Triassic measures* occur in Germany; the British representatives consist of variously colored sandstones and marls. They occupy a considerable surface in Lancashire, Cheshire, Shropshire, and Stafford, and extend as a ribbon of varying breadth, from the mouth of the Exe, through Devon, Somerset, Gloucester, Worcester, Warwick, Leicester, Nottingham, York, and Durham, to the coast of Hartlepool. The only deposits of rock-salt in Britain occur in the triassic rocks of Cheshire and Worcestershire.

The *Lias* consists of white sandstones, limestones, shales, marls, and alum slates. They abound in fossils, especially in the remains of reptiles, fishes, mollusca, and encrinites. The strata of this age occupy a band between the Trias and the Oolite, extending from Lyme Regis to the mouth of the Tees. Two small tracts of lias occur, the one in Glamorgan, and the other in Shropshire. In Scotland, small patches exist at Brora in Sutherland, and in the islands of Skye, Eigg, and Mull.

The *Oolite measures* are composed of an extensive series of limestones, sandstones, and shales, which occupy a belt of nearly 30 m. broad, from Yorkshire to Dorsetshire, passing through Lincoln, Northampton, Huntingdon, Bedford, Buckingham, Oxford, and Wilts. The best building materials in England are obtained from these strata. oolite strata occur in Scotland at Brora and in Skye. In the Brora oolite, a seam of coal $3\frac{1}{2}$ ft. in thickness has been worked for upwards of a century. It is the thickest bed of pure vegetable matter detected in any secondary formation in Britain.

The fresh-water *Wealden series*, with their abundant remains of reptiles, fishes, shells, and insects, occur in Kent and Sussex, in the isle of Wight, and in the s. of Devon.

The beds of the *Cretaceous period*, consisting chiefly of chalk with intercalated sands and clays, all very rich in fossil remains, occupy a broad tract to the e. of the oolite strata, and parallel to them. Beginning a little n. of Flamborough Head, they may be traced through York and Lincoln, then across the Wash into Norfolk, Suffolk, Hertford, Buckingham, Oxford, Berks, to Hampshire, where they separate into three arms, the one extending south-westward through Wilts and Dorset to the s. coast; another taking a s.e. direction to Beachy Head; and the third stretches as a narrow band in an easterly direction through Surrey and North Kent, widening out as it nears the coast, where it occupies the district between Ramsgate and Folkestone.

Eocene strata, consisting of clays, sands, and marls, abounding in fossils which apparently indicate a sub-tropical climate, occupy the valley of the Thames, from Hungerford to the sea, and from Canterbury to Saxmundham, as well as a large district in Dorset, Hants, and Sussex, from Salisbury w. to Dorchester, and e. almost to Hastings.

Unless the beds in Mull, containing the numerous impressions of leaves of exogenous plants, are *miocene strata*, there are no representatives of this period in Britain.

The *Pliocene deposits* of ferruginous shelly sand and marl known as red crag occur chiefly in Suffolk. The still more recent *pleistocene deposits* of fresh-water sand and gravel, and mammaliferous crag, are found on the coasts of Norfolk, Suffolk, Essex,

and Kent. The till and glacial beds of the same age are scattered as superficial deposits over large districts in Britain. Fossiliferous beds of this age occur in Caithness, in the valley of the Clyde, and in Lancashire; they contain remains of mollusca, many of which still live in the seas of boreal America.

Minerals—Coal.—From the collieries in Britain in 1876 were raised 133,344,766 tons of coal. The greatly increasing consumption of coal has originated fears as to the possibility of the exhaustion of our mineral fuel. It appears that, while in 1820, only 15,000 000 tons were raised, in 1840 the amount had reached 30,000,000, and in 1860 it was nearly 84,000,000. At the same rate of increase, the known coal, within a workable distance from the surface, would last at least 100 years. But the consumption, during the last 20 years of the century, would, at the present increasing ratio, amount to 1464 million tons a year, a quantity vastly greater than can possibly be used. We need not, therefore, now begin to fear lest our coal-fields should be speedily used up.

Iron.—Formerly, the only iron produced in the country was obtained from the greensand of the s.e. of England, and from the brown hematite of the Dean forest. The ore was smelted with charcoal. But the introduction of coke and coal for smelting, and the discovery of numerous additional and unthought-of deposits, especially in connection with coal-bearing strata, has immensely increased the production of iron, and met the greatly increased demands for this important metal. In 1760, when charcoal alone was used for smelting, not more than 25,000 tons of iron were produced; while in 1860, no less than 3,826,752 tons were obtained from 8,024,206 tons of ore. The market value of the metal was £12,703,950. In 1876 the total iron ore production of the United Kingdom, of which returns were received, amounted to 16,841,583 tons, of the value of £6,825,705. The most important ore is the ferruginous shale, or impure argillaceous carbonate of iron, which occurs in connection with every coal-field in Britain. The brown and red hematite, associated with the oldest paleozoic rocks, yield also a large amount of metallic iron.

Tin is obtained from only two counties—Cornwall and Devon. In 1876 the produce was 8,500 tons of metallic tin, worth £675,750.

Copper is principally obtained from the same two counties. There are about 101 different mines, which produced, in 1876, 79,252 tons of ore, yielding 4,694 tons of metallic copper, worth £392,300. In 1860 there was a yield of 13,789 tons of ore, producing 935 tons of metal, worth £100,691, chiefly from the counties of Lancaster, Caermarthen, and Anglesey, very small quantities being supplied from Cumberland, Chester, Cardigan, and the isle of Man.

Lead and *silver* are obtained from the same ore from numerous mines in palæozoic districts. The most productive English mines are in Northumberland, Durham, Cumberland, York, and Derby, in Shropshire, and in Cornwall and Devon. Small quantities are obtained in Somerset, Westmoreland, Stafford, and Chester. All the Silurian counties of Wales contain mines. The isle of Man yields nearly 3,000 tons of ore. In Scotland, the most productive mines are at Wanlockhead and Leadhills; Argyle, Perth, and Kirkcudbright also supply small quanties. The total amount of ore raised in 1876 was 79,096 tons, yielding 58,667 tons of metal, worth £1,270,415. From this there were separated 483,422 ounces of silver, worth £106,222.

Zinc is obtained from Cornwall and Devon, Cardigan and North Wales, Derby, Cumberland, and the isle of Man. The produce in 1876 was 23,613 tons of ore, valued at £90,142. The metallic zinc obtained from this amounted to about 6,641 tons, valued at £158,011.

Sulphur ores (iron pyrites) were raised in different parts of Great Britain; chiefly in Cornwall, to the extent, in 1876, of 48,809 tons, worth £43,870.

The following minerals are also raised in Cornwall, viz., arsenic, manganese, gossan, nickel, silver-copper, fluor-spar, and wolfram.

Salt occurs in Cheshire, Worcestershire, Staffordshire, and Ireland; produce (1876) 2,273,256 tons, valued at £1,136,628.

The mineral produce of Great Britain amounted in 1876 to £58,691,832.

Physical Geography.—The physical features of a country are intimately connected with its geological structure. The older paleozoic rocks produce mountainous regions, intersected with deep and narrow valleys. The newer strata seldom rise to a great height. Their high lands are rounded undulations of the strata, except where igneous rocks are intruded, and the valleys are broad and shallow. In Scotland we have, consequently, two extensive mountainous districts, occupied chiefly with rocks of silurian age, and an intervening valley filled up with old red sandstone and carboniferous measures. The northern mountain region is intersected by the Great Glen, which is a fissured anticlinal axis in the silurian strata. It is difficult to group the mountains in this district. The Grampians from Aberdeen to Argyle show the most marked linear arrangement; the greatest eminence in this range is Ben Lawers (3,945 feet). Between the Grampians and the Great Glen a succession of great eminences occur, the highest of which, and the culminating point of the whole British isles, is Ben Nevis (4,406 feet). To the n. of the valley of the Caledonian canal, the region is a confused mass of mountains, reaching in Ben Attow a height of 4,000 feet. Caithness consists of plains of undulating sandstone, covered with drift; the headlands and sea-cliffs in this county are bold and striking. The coast-line of the paleozoic region of the n. of Scotland is repeat-

edly broken by numerous and large friths or sea-lochs, and the interior abounds in picturesque lakes. The silurians of the s. of Scotland form an extensive mountain range crossing the island from St. Abb's Head to Stranraer. The rocks are less indurated than in the n., and the scenery is consequently not so wild. The mountains have generally broad flattened forms, intersected by deep pastoral glens, which widen out into broader valleys and dales. The principal heights are Hartfell (2,790 ft.) and Black Larg (2,890 feet). The great central valley of Scotland embraces the basins of the Clyde, Forth, and Tay. It contains several tracts of rich table-land, and is frequently broken through by igneous rocks, chiefly trappean, which project into bold and picturesque hills.

England and Wales, in the Cambrian and silurian districts, have the same mountainous character as similar districts in Scotland; but as so much of England is occupied with newer strata, it may be considered on the whole as a level country, traversed by ridges of varying elevation, which form the water-sheds of the country. The range, beginning with the Cheviot hills, is continued from the borders of Scotland southwards, as the Pennine range, through Northumberland, Cumberland, Westmoreland, Lancashire, and Yorkshire, to the middle of Derbyshire; it varies in height from 1200 to 3,000 ft., reaching its highest summit in Crossfell, Cumberland, which is 3,383 ft. high. The band of lias and oolite, extending from Yorkshire to Dorset, forms a tortuous range of table-land, rising sometimes into hills to the height of 1500 ft., and throughout its course presenting generally a bold escarpment to the w., and having a gentle slope to the east. To the w. of this range of table-land are the valleys of the Yorkshire Ouse, the Trent, and the Severn; on the e., the Great Ouse and the upper portion of the Thames. Beyond these two rivers, the country rises into a range of low chalk-hills, which follow the cretaceous strata from Norfolk to Wilts, dividing with the strata into three ranges, two of which take an easterly direction through Sussex and Surrey and Kent, bordering the Wealden strata, and forming the s. and n. Downs. Devon and Cornwall are mountainous, from the intrusion of granite and other igneous rocks through the paleozoic strata.

The details of the physical geography are given under the names of the several counties, lakes, rivers, etc.

Climate.—The climate of Great Britain derived its peculiar character from the insular situation of the country, taken in connection with the prevailing direction of the winds. It is mild and equable in a remarkable degree, the winters being considerably warmer, and the summers colder than at places within the same parallels of latitude. For at least three months, the mean monthly temperature ranges between 50°.0 and 60°.0; for other three months it continues about 60°.0, or occasionally a little higher, seldom more than three degrees; and for the remaining six months it ordinarily ranges between 36°.0 and 48°.0. Since the reports of the registrar-general clearly prove that the temperature most conducive to health is between 50°.0 and 60°.0, it follows that, as far as concerns temperature, the climate of Great Britain is one of the healthiest in the world.

As appears from data furnished by the reports of the English and Scottish meteorological societies, the mean temperature of England is 49°.5, and of Scotland 47°.5. The mean temperatures of the following places, arranged according to the latitude, have been deduced from the same sources: Guernsey, 50°.2; Truro, 51°.3; Ventnor, 51°.5; Barnstaple, 50°.8; Aldershott, 49°.4; Greenwich, 49°.5; Bedford, 49°.3; Derby, 48°.8; Liverpool, 48°.9; Manchester, 48°.0; Isle of Man, 47°.8; Scarborough, 47°.0; Milne-Graden (Berwick), 46°.8; Dalkeith, 46°.9; Rothesay, 47°.8; Greenock, 47°.9; Arbroath, 46°.6; Culloden, 46°.8; Tongue, 46°.5; Sandwick (Orkney), 45°.6; and Bressay (Shetland), 45°.3. There is thus a difference of fully six degrees between Ventnor, in the Isle of Wight, and Shetland. As this difference is chiefly attributable to the difference of their latitudes, it follows, that it will become greater as the force of the sun's rays increases; and hence, while the winter temperatures are respectively 42°.2 and 39°.5, the summer temperatures are 61°.8 and 53°.4. A pretty regular decrease of temperature, with an increase of latitude, will be observed, particularly if the places on the w. side of the island be regarded as a distinct series by themselves. It will appear, on examination, that the temperatures of places on the w. are about a degree in excess of those of places in the same latitudes, but at some distance from the Atlantic. In winter, the differences between the w. and the other parts of the country are still greater. Thus, whilst the winter temperature of Truro is 45°.0; Guernsey, 43°.8; Ventor and Barnstaple, 42°.2; Isle of Man, 41°.8; Liverpool, 40°.6; and Greenock, and the whole of the w. coast of Scotland as far as Shetland, 39°.5—that of Greenwich is 37°.9; Nottingham, 37°.3; York, 37°.1; Scarborough, 38°.8; Dalkeith, 37°.0; Arbroath, 37°.1; and Culloden, 38°.2.

The s.w. winds are the most prevalent throughout the year, except in April and May, when they give place to the n.e. winds. The notoriously dry and parching character of the latter render them very deleterious to health. On the other hand, the s.w. winds, coming from the Atlantic, are moist and genial, and it is on their greater frequency—being, as compared with the n.e., in the proportion of two to one—that the salubrity of the climate in a great measure depends.

In those districts of England where hills do not interfere, the annual rainfall is about 25 in., and in similar parts of Scotland about 28 in.; but these amounts, which may be

considered as the mimimum falls, are variously increased by proximity to hills, according as the place is situated in the e. or w. of the island, viewed in relation to the direction of the wind which brings the rain, and by its lying to the wind or lee side of these hills. Since it is the s.w. winds which bring the rain, the heaviest falls take place among the hills in the w. of the country; and it may be here observed that, in the w., where there are no hills lying to the n.w., w., or s.w., the annual rainfall is about the mimimum. The annual rain fall in Cornwall, Wales, Cumberland, and the west Highlands, may be estimated at from 45 to 65 inches. In some places, however, this amount is far exceeded. At Seathwaite, in Cumberland, for instance, the rainfall is truly tropical, the mean annual amount being 127 in.; in 1861 it was 182 in.; and in the month of Nov. of that year the enormous quantity of 35.41 in. fell at this station. At Tyndrum, in Perthshire, 134.5 in. fell in 1861; and at this place, and among the Arrochar hills, the monthly rainfall is occasionally between 20 and 30 inches.

Natural History.—The natural history of Great Britain corresponds generally with that of continental Europe (q.v.). Very few species, either of plants or animals, are peculiar to Great Britain. The flora of the greater part of the island most nearly resembles that of Germany; but in the s. of England there is, as might be expected, a closer correspondence with that of the n.w. of France; and some plants found in the Channel islands and on the French coast appear nowhere in Britain but in the s.w. of England. The mountains of Wales, Cumberland, and Scotland have a vegetation resembling that of Scandinavia more than that of the mountains of central or southern Europe. The state of the case is much the same as to the fauna. There are, however, many remarkable instances both of plants and animals, which, from these apparent relations to continental Europe, might be expected in Great Britain, and which are not indigenous to it. As examples, may be mentioned, among plants, the Norway spruce, and among animals, the lemming, both common in Scandinavia. The progress of civilization and of cultivation has completely banished from Great Britain many of the animals which were once numerous, as bears, wolves, etc. But on the contrary, many plants which were unquestionably introduced by man, have become thoroughly naturalized.

Ethnology.—The present population of the island of Great Britain is the result of successive waves of immigration and conquest. When the Romans invaded Britain (54 B.C.), the inhabitants were Celtic; and they continued to be essentially so until the 5th and 6th centuries, when—the Romans having previously retired—the level parts of the country were gradually overrun and subdued by German tribes from the opposite coasts. Then followed invasions of Danes and other Scandinavian nations, and lastly the Norman conquest. As the Normans, however, were originally from Scandinavia, they cannot be considered as adding any new ethnological element; so that the inhabitants of England (excepting Wales) and of the Lowlands of Scotland may be considered as sprung from an amalgamation of the original Celtic with German and Scandinavian blood, the latter having predominated so as to determine the language, institutions, and character of the resulting race. Wales and the Highlands of Scotland are still inhabited by representatives of the ancient Celtic tribes. See WELSH LANGUAGE AND LITERATURE; SCOTLAND; PICTS; IRELAND; CELTIC NATIONS; BRITANNIA; and ANGLO-SAXONS.

Notwithstanding the union of the two kingdoms into which the island was once divided, the distinction, for certain purposes, is still kept up. England (including Wales), the larger and southern division, extends as far n. as the parallel of 55° 48′, the boundary-line running between Berwick-on-Tweed and the Solway firth (see BORDER, THE); its greatest length is about 400, and its greatest breadth about 320 miles. Area, about 58,300 sq. miles. England resembles to some extent a triangle in shape, its southern shore forming the broad base, and its e. and w. coasts gradually approaching until the apex is reached at Berwick-on-Tweed. Scotland occupies the northern part of the island; its greatest length (from the Mull of Galloway to Dunnet Head) is about 287 m.; its greatest breadth (from Peterhead to Ardnamurchan point) about 182 m.; elsewhere, however, the breadth is much less. Between Alloa, on the Forth, and Dumbarton, on the Clyde, it is only 33 m.; between the head of Loch Broom, on the w. coast, and of Dornoch firth, on the e., only 26 m., and n. of Inverness, the average breadth does not exceed 70 miles. The entire area is about 31,300 sq. miles. The greater part of the surface of Scotland is irregularly distributed into mountain and valley, a very small proportion spreading into level plains. The eastern coast forms a waving, continuous, and rarely broken line; but the western is extremely irregular, being deeply indented with bays and arms of the sea, and exhibiting steep promontories and mountainous islands. The whole country is physically divided into *highlands* and *lowlands*—the former comprehending the n.w., w., and central portions; the latter, generally speaking, the e. coast, and the country s. of the Forth and Clyde.

Islands.—The Island of Great Britain is surrounded by the Isle of Man, Anglesey, the Scilly isles, the Isle of Wight, the outlying Channel islands, the Shetland isles, the Orkneys, and the Hebrides, each having generally a mainland encircled by small islands and rocks, bare or scantily covered, which sea-fowls inhabit, fishermen in their boats visit, and shepherds sometimes dwell in during summer. The coast against the North sea has few islands, except Thanet, Sheppey, and some lowlands, which are isolated at high water. Coquet, Staples, Holy island, May island, Inchkeith, and Inchcolm, are the only ones inhabited. The Orkneys and the Shetlands lie to the north. St. Michael,

Looe, and the isle of Wight, are the only islands on the s. coast, except those sometimes connected with the land, and the Channel islands off the coast of Normandy. All the other islands lie on the w. coast, extending from the Scilly isles, through Anglesey and Man, to the island of Lewis. According to the census of 1851 there were about 500 of these islands and rocks, of which only 175 were inhabited; but in 1861 a more careful enumeration was made, when it was ascertained that Scotland alone had 787, of which 186 were inhabited. The number belonging to England was not stated.

For administrative purposes, Great Britain, with its surrounding islands (excepting the Channel islands and the isle of Man, which are under peculiar jurisdiction), is divided into 84 counties or shires. The following tables exhibit their several areas and populations·

ENGLAND.

Counties.	Area in Stat. Acres.	Inhabited Houses, 1871.	Population, 1871.	Population, 1861.
Bedford	295,582	30,508	146,256	135,265
Berks	451,210	39,612	196,445	176,103
Buckingham	466,932	37,162	175,870	166,597
Cambridge	525,182	40,091	186,363	175,950
Chester	707,078	110,743	561,131	505,153
Cornwall	873,600	73,956	362,098	369,323
Cumberland	1,001,273	44,069	220,245	205,293
Derby	658,803	78,530	380,538	339,377
Devon	1,057,180	105,175	600,814	584,581
Dorset	632,025	39,404	195,544	188,651
Durham	622,476	114,658	685,045	509,018
Essex	1,060,549	92,359	466,427	404,614
Gloucester	805,102	102,347	534,320	485,502
Hereford	534,823	26,380	125,384	123,659
Hertford	391,141	39,330	192,725	173,294
Huntingdon	229,544	14,031	63,672	64,297
Kent	1,039,419	151,171	847,507	733,675
Lancaster	1,219,221	530,431	2,818,904	2,428,744
Leicester	514,164	58,559	268,764	237,402
Lincoln	1,775,457	94,119	436,163	411,997
Middlesex	180,136	321,021	2,539,882	2,205,711
Monmouth	368,399	35,488	195,391	174,670
Norfolk	1,354,301	99,599	438,511	435,422
Northampton	630,358	51,970	243,896	227,737
Northumberland	1,249,299	62,415	386,959	343,028
Nottingham	526,076	68,604	319,956	393,784
Oxford	472,717	37,837	177,956	172,266
Rutland	95,805	4,772	23,070	21,851
Salop	826,055	50,766	248,004	240,876
Somerset	1,047,220	92,105	463,412	444,725
Southampton	1,070,216	98,172	543,837	481,495
Stafford	728,468	167,487	857,333	746,584
Suffolk	947,681	76,496	348,479	336,271
Surrey	478,792	168,109	1,090,270	830,685
Sussex	936,911	75,200	417,407	363,648
Warwick	563,946	131,775	633,902	561,728
Westmoreland	485,432	12,674	65,005	60,809
Wilts	865,092	54,821	257,202	249,445
Worcester	472,165	70,034	338,848	307,601
York, E. Riding	768,419	56,430	269,505	240,359
" City	2,720	9,141	43,796	40,377
" N. Riding	1,350,121	58,539	291,589	244,804
" W. Riding	1,709,307	382,787	1,831,223	1,507,511
Total of England	32,590,397	4,008,877	21,487,688	18,949,930

WALES.

Counties.	Area in Stat. Acres.	Inhabited Houses, 1871.	Population, 1871.	Population, 1861.
Anglesey	193,453	12,175	50,919	54,546
Brecon	460,158	12,644	59,904	61,627
Cardigan	443,387	16,482	73,488	72,255
Caernarvon	606,331	24,603	116,944	111,757
Denbigh	370,273	23,303	106,122	95,668
Flint	386,052	22,309	104,266	100,862
Glamorgan	184,905	16,626	76,245	69,870
Merioneth	547,494	73,409	396,010	317,751
Montgomery	385,291	10,159	47,369	38,888
Pembroke	488,323	13,936	67,789	67,075
Radnor	401,691	19,568	91,036	96,093
	272,128	4,941	25,428	25,403
Total of Wales	4,734,486	250,155	1,216,420	1,111,795

SCOTLAND.

Counties.	Area in Stat. Acres.	Inhabited Houses, 1871.	Population, 1871.	Population, 1861.
Aberdeen	1,260,625	34,589	244,603	221,380
Argyle	2,083,126	13,497	75,679	80,995
Ayr	735,262	26,798	200,809	198,959
Banff	439,219	11,603	62,023	59,234
Berwick	297,161	6,491	36,486	36,614
Bute	143,097	2,433	16,977	16,188
Caithness	455,708	7,474	39,992	41,216
Clackmannan	31,876	3,316	23,747	21,449
Dumbarton	172,677	7,638	58,857	52,035
Dumfries	705,946	13,646	74,808	75,877
Edinburgh	234,926	27,856	328,379	272,869
Elgin or Moray	340,000	8,452	43,612	42,692
Fife	328,427	27,056	160,735	154,555
Forfar	569,840	25,663	237,567	204,365
Haddington	179,142	7,179	37,771	37,623
Inverness	2,723,501	16,575	87,531	87,435
Kincardine	248,284	6,661	34,630	34,461
Kinross	49,812	1,517	7,198	7,975
Kirkcudbright (Stewartry)	610,343	7,457	41,859	42,430
Lanark	568,808	47,962	765,239	631,559
Linlithgow	81,114	6,255	40,965	38,845
Nairn	137,500	2,029	10,225	10,065
Orkney and Shetland	598,726	11,955	62,882	64,094
Peebles	227,869	2,187	12,390	11,408
Perth	1,564,690	22,134	127,768	133,511
Renfrew	162,428	13,551	216,347	177,407
Ross and Cromarty	2,016,375	15,713	80,955	81,280
Roxburgh	438,494	7,829	53,974	54,109
Selkirk	166,524	1,741	14,005	10,449
Stirling	298,579	13,275	98,218	91,926
Sutherland	1,207,188	4,914	24,317	25,208
Wigton	327,906	6,733	38,880	42,038
Total of Scotland	19,496,133	412,185	3,360,018	3,061,251

The United Kingdom of Great Britain and Ireland is, since the union of Ireland, the full official designation of the country more generally known as Great Britain, Britain, or the United Kingdom. In addition to the home territories, Great Britain possesses a multitude of dependencies scattered over every part of the globe, and constituting "an empire on which the sun never sets."

The following tables exhibit the extent and population of the several constituent parts of this empire, according to the latest available accounts:

UNITED KINGDOM.

	Area in English Square Miles.	Population according to the Census of					
		1821.	1831.	1841.	1851.	1861.	1871.
Great Britain—							
England	50,922	11,281,883	13,090,523	15,002,443	16,921,888	18,949,930	21,495,131
Wales	7,397	718,353	806,274	911,705	1,005,721	1,111,795	1,217,135
Scotland	30,402	2,091,521	2,364,386	2,620,184	2,888,742	3,061,251	3,360,018
	88,781	14,081,762	16,261,183	18,534,332	20,816,351	23,122,976	26,072,284
Ireland	32,481	6,801,827	7,767,401	8,175,124	6,551,970	5,792,055	5,411,416
Islands—							
Guernsey, etc.	50	20,827	26,128	28,521	33,719	35,362	33,969
Jersey	62	28,600	36,582	47,544	57,020	56,078	56,627
Man	282	40,081	41,000	47,975	52,387	52,339	54,044
Army, Navy, etc.	.....	307,790	277,017	216,079	225,916	275,900	229,000
Total	121,656	21,280,887	24,409,311	27,049,575	27,737,363	29,334,710	31,857,338

COLONIES AND FOREIGN POSSESSIONS.

Colonies.	Area in Sq. Miles.	Population, 1871.
India	910,853	151,146,516
Straits Settlements	1,225	307,951
Ceylon	24,454	2,405,287
Mauritius	708	316,042
Labuan	45	4,868
Hong Kong	32	124,198
Australia—		
New South Wales	323,437	503,981
Victoria	86,831	720,654
South Australia	383,328	185,626
Western Australia	978,000	25,084
Queensland	678,000	115,567
Tasmania	26,215	100,765
New Zealand	106,259	255,293
Fiji Islands	8,034	148,140
Falkland Isles	7,600	811
Natal	16,145	250,352
Cape Colony	250,610	720,984*
Transvaal (annexed 1877)	114,340	315,000
Sierra Leone and Gambia	489	53,126
Gold Coast	6,000	400,070
St. Helena	47	6,444
North America—		
Dominion of Canada, consisting of		
Ontario	121,260	2,001,994
Quebec	210,020	1,389,475
New Brunswick	27,105	285,777
Nova Scotia	18,660	387,800
British Columbia	213,000	40,000†
Manitoba	14,340	11,963
Prince Edward Island	2,173	94,021
Newfoundland	40,200	146,536‡
Bermuda	24	12,121
Honduras	13,500	25,635
West India Islands—		
Bahamas	3,021	39,162
Turk's Island	420	4,723
Jamaica	6,400	506,154
Virgin Islands	57	6,651
St. Christopher	103	28,169
Nevis	50	11,785
Antigua	183	35,157
Montserrat	47	8,003
Dominica	291	27,178
St. Lucia	250	31,610
St. Vincent	131	35,588
Barbadoes	166	162,042
Grenada	133	38,423
Tobago	97	17,054
Trinidad	1,754	109,638
British Guiana	76,000	193,491
Gibraltar	1§	25,216
Malta	115	149,084§

Most of the subjects which enter into a complete account of Great Britain are treated under separate heads. The following are brief indications of a general kind:

Agriculture.—The soil of Great Britain is almost exclusively devoted to the production of the two necessaries—breadstuffs and grass (roots, etc., for domestic animals). For this purpose, both the soil and the climate are admirably suited. M'Culloch estimated the number of acres in England under grain crops in 1852-53 at 6¼ millions (wheat, 3 millions; barley, 1; oats and rye, 2; beans and peas, ¼), and the total produce at 27½ million quarters—value £37,000,000. The produce of potatoes, turnips, rape, and clover is estimated at £26,000,000. The annual value of the pastures and meadow-hay is immense. In 1857, according to the careful statistics collected by the highland and agricultural society of Scotland, there were in Scotland 3,556,572 acres under rotation, the chief crops being grass and hay, 1,459,805 acres; oats, 938,613 acres, yielding 32,750,763 bushels; wheat, 223,152, yielding 6,154,986 bushels; barley, 198,387, yielding 6,564,429 bushels; turnips, 476,691 acres, yielding 6,690,109 tons; potatoes, 139,819 acres, yielding 430,468 tons. The live-stock amounted to 6,989,368—viz., 185,409 horses, 974,437 cattle, 5,683,168 sheep, and 146,354 swine. The total extent of land returned in 1874 as being under all kinds of crops, bare fallow, and grass was 31,266,919 acres in Great Britain, 15,752,187 acres in Ireland, 94,100 acres in the Isle of Man, 18,436 (1873) acres in the island of Jersey, and 11,678 acres in the islands of Guernsey, Alderney, etc., making a total for the United Kingdom of 47,143,320 acres. The total acreage of land returned as under cultivation in Great Britain has been larger in each year since the returns were first collected from all occupiers of land in 1868. The live-stock in the

* In 1875. † In 1870. ‡ In 1869.
§ Cyprus (q.v.), though now occupied and administered by Great Britain, is of course not properly a "possession."

United Kingdom in 1874 was as follows: The number of horses included in the agricultural returns was 1,847,148; in Great Britain, only horses used for agriculture, unbroken horses, and mares kept solely for breeding, are included in the returns; by adding 915,000 for the estimated number of all descriptions of horses, we find the total number of horses in the United Kingdom to be 2,860,000. The total number of cattle returned for the United Kingdom in 1874 was 10,281,036; of sheep the total number was 34,837,597; and of pigs, 3,557,354. Of these numbers of live-stock, Great Britain (exclusive of the islands) possessed 2,225,000 horses, and Ireland 525,770; giving a proportionate number, per 100 acres of land under cultivation, of 7.1 in Great Britain, and 3.4 in Ireland. Of cattle of all kinds there were 6,125,491 in Great Britain, or 19.6 per 100 acres; and 4,118,113, or 26.1 per 100 acres, in Ireland. Sheep numbered 30,313,941, or 97.0 per 100 acres, in Great Britain, and not more than 4,437,613, or 28.2 per 100 acres, in Ireland. There were 2,422,832 pigs, or 7.7 per 100 acres, in Great Britain, exclusive of those kept by cottagers and in towns; and 1,096,494, or 7.0 per 100 acres, in Ireland.

Manufactures.—The following table exhibits the condition of the textile manufactures:

	Factories in					Horse-power in				Hands employed.				
	1838.	1850.	1856.	1870.	1875.	1838.	1850.	1856.	1870.	1838.	1850.	1856.	1870.	1875.
Cotton	1,819	1,932	2,210	2,483	2,655	59,803	82,555	97,132	309,870	259,104	330,924	379,213	420,588	479,515
Woolen	1,322	1,497	1,505	1,829	1,800	20,617	22,144	25,501	62,302	54,808	74,443	79,091	109,300	134,605
Worsted	416	501	525	630	692	7,176	11,515	14,904	51,035	31,628	79,737	87,794	106,125	142,097
Flax	392	393	417	500	449	11,089	14,292	18,322	56,995	43,557	68,434	80,262	38,031	128,459
Silk	268	277	460	696	818	3,384	3,711	5,176	8,589	34,303	42,544	56,137	47,461	45,559
Total	4,217	4,600	5,117	6,138	6,414	102,069	134,217	161,435	488,791	423,400	596,082	682,497	729,405	930,235

The jute trade is rapidly rising into importance, especially in Scotland. In 1861 there were 36; in 1868, 41; and in 1875, 110 jute factories in the United Kingdom; and the total number of persons, male and female, employed in this manufacture in 1875 was 37,920.

For other great branches of industry, see Iron, Paper, Pottery, etc.

Imports and Exports.—The following table exhibits the value of the imports and exports for the years 1857, 1858, 1861, and 1875:

	1857.	1858.	1861.	1875.
Imports		£164,582,832	£217,351,881	£373,941,125
Exports, British Produce	£137,844,441	116,608,756	125,115,133	223,494,570
Exports, Foreign and Colonial Produce	122,066,107	23,174,023	35,694,297	45,402,198
Total Exports	24,108,194	£139,782,779	£160,809,430	£268,896,768
Total Imports and Exports	£146,174,301	£304,368,611	£378,161,311	£642,837,893
	£334,018,749			

The chief imports are raw cotton, corn and flour, sugar, wool, silk manufactures, and tea; the chief exports are cotton manufactures, woolen and worsted manufactures, iron and steel, linen manufactures, coals and culm, and machinery.

Gold and Silver Bullion and Specie.—The computed real value of the gold and silver bullion and specie brought into the United Kingdom in 1858 was £29,493,190; in 1859, £37,070,156; in 1860, £22,978,196; and in 1861, £18,747,045. Of this quantity, Australia sent by far the most—viz., in 1858, £9,066,289; 1859, £8,627,854; 1860, £6,719,857; and 1861, £6,331,828. Mexico, South America, and the West Indies were the next largest exporters; then the United States and France. The exports from the United Kingdom during the same period were—1858, £19,628,876; 1859, £35,688,803; 1860, £25,534,768; 1861, £20,811,648. The declared real value of gold and silver bullion and specie imported into the United Kingdom during the year 1871 was—gold, £21,613,005; silver, £16,527,322; total, £38,140,327; exported—gold, £20,698,275; silver, £13,062,396; total, £33,760,671. The declared real value of such bullion and specie imported during the year 1875 was as follows—gold, £23,100,834; silver, £10,123,955; total, £33,224,789; exported—gold, £18,810,426; silver, £8,906,726; total, £27,717,152.

Shipping.—Great Britain had, in 1861 (exclusive of river-steamers), 19,288 registered sailing-vessels, with an aggregate burden of 3,918,511 tons, and 997 steamers, carrying 441,184 tons, making together 20,285 vessels, of 4,359,695 tons burden, and employing, exclusive of masters, 171,957 seamen. During the same year, there were built and registered in the United Kingdom 1186 vessels, 215 of them steam, of an aggregate burden of 310,900 tons. The total tonnage of vessels entering and clearing British ports in 1861 was 26,595,641 tons, 21,924,983 tons representing cargoes, the rest being in

ballast. The coast trade of Great Britain during the same year amounted to 17,355,235 tons, all but 93,000 tons being carried by British ships. In 1871 the number of registered sailing-vessels engaged in the home trade was 11,838, employing 41,828 men, and their tonnage was 777,185. The number of steam-vessels, exclusive of river steamers, in the same trade was 1191; men, 12,613; tons, 195,125. The number of sailing-vessels engaged in foreign trade was, in the same year, 300, with 5,767 men, and an aggregate of 157,964 tons; and of steam-vessels, 1066, with 40,323 men, and an aggregate of 936,914 tons. In 1875 there were in the United Kingdom 20,644 sailing-vessels and 4,160 steamers registered under the merchant shipping act. The estimated number of seamen was 257,336, an increase of more than 50,000 since 1870. It will be seen that the merchant navy is availing itself, to a large degree, of steam-power.

Railways.—The total length of lines open for traffic in the United Kingdom in 1860 was 10,433 miles. During the year, 163,435,678 passengers traveled, of whom 20,625,851 were first class, 49,041,814 second class, and 93,768,013 third class. The amount of money derived from these travelers was—first class, £3,170,935; second class, £3,944,713; third class, £4,162,487. Luggage, mails, etc., brought up the receipts from passenger-traffic to £13,085,756. The goods-traffic in the same year amounted to £14,680,866, making a total income of £27,766,622. The total amount invested in railways by shares and loans in 1858 was £325,375,507, on which was paid interest to the total amount of £6,653,166. The average rate of dividend on the ordinary share capital over the whole kingdom in 1858 was 3.06 per cent; the proportion per cent of expenditure to total receipts in 1860 was 47. In 1860 the rolling-stock of the various companies consisted of 5,801 locomotives, 15,076 carriages of all kinds, and 180,574 wagons. At the end of 1874 there were 16,448 miles of railway open for traffic—showing an addition since 1860 of 6,015 miles. Of this entire length 11,622 miles belonged to England and Wales; to Scotland, 2,609; and to Ireland, 2,127. To the total capital paid up, England and Wales contributed £508,720,097; Scotland, £71,327,140; and Ireland, £29,902,682. At the end of 1877 there were 12,098 miles of railway open in England and Wales; 2,776 in Scotland; in Ireland, 2,203—in all, 17,077 miles.

Revenue and Expenditure.—The following table shows the total amounts of the actual revenue and expenditure for the seventeen years from 1860 to 1875, along with the proportion of receipts and of expenditure for each person in the United Kingdom:

	Revenue.		Expenditure.	
	Receipts at the Exchequer.	Proportion per head of Population.	Payments out of the Exchequer.	Proportion per head of Population.
		£ s. d.		£ s. d.
1860	£71,089,669	2 9 10	£69,502,289	2 8 8
1861	70,283,674	2 8 11	72,792,059	2 10 8
1862	69,674,479	2 8 3	71,116,485	2 9 11
1863	70,603,561	2 8 4	69,302,008	2 8 2
1864	70,208,964	2 7 9	67,056,286	2 6 2
1865	70,313,436	2 7 7	66,462,206	2 5 4
1866	67,812,292	2 5 7	65,914,357	2 4 8
1867	64,434,568	2 6 5	66,780,396	2 4 0
1868	60,600,218	2 6 2	71,236,242	2 6 7
1869	72,591,991	2 7 9	74,971,816	2 8 8
1870	75,434,252	2 9 3	68,864,752	2 4 0
1871	69,945,220	2 5 4	69,548,539	2 4 3
1872	74,708,314	2 7 3	71,490,020	2 5 0
1873	76,608,770	2 8 2	70,714,448	2 4 5
1874	77,335,657	2 8 2	76,466,510	2 7 7
1875	74,921,873	2 6 3	74,328,040	2 5 10
1876	77,131,693	.....	76,545,208	.....

The income of the United Kingdom is derived from the various sources of customs, excise, stamps, taxes, property and income tax, post-office, etc. The following are the sums received by the exchequer from these sources during the financial year 1876–77: Customs, £20,410,420; excise, stamps, taxes and income-tax, £47,794,840 (of which the net receipts from customs were £19,922,000; from excise, £27,736,000; from stamps, £10,890,000; from land-tax, £2,532,000; from income-tax, £5,280,000): post-office, £7,314,750; telegraph service, £1,305,000; crown-lands, £539,411; miscellaneous, £4,572,321. Total, £81,945,535. The following are the principal items of expenditure in the same year: Interest and management of debt, £27,992,813; army, £16,814,716; navy, £11,364,383; miscellaneous civil services, £13,333,851; charges for collecting customs and inland revenue, £2,766,279; post-office, £3,159,218; telegraph service, £1,141,000.

National Debt.—At the end of the financial year 1877, the national debt of Great Britain and Ireland amounted to £775,873,713, of which £712,621,355 was funded, and £13,943,800 was unfunded. See Debt, National.

Army and Navy.—See British Army; and Navy, British.

Form of Government.—The government of Great Britain is of the kind known as a "constitutional monarchy," in which the sovereign accepts of his dignity under an express

agreement to abide by certain prescribed conditions. See CORONATION OATH. The sovereignty is hereditary in the family of Brunswick, now on the throne, and in the person of either a male or a female. The sovereign (king or queen) is the directing power in the executive of government; while the legislative function is exercised by parliament. Further information regarding the British constitution and laws will be found under the heads PARLIAMENT; MINISTRY; COMMON LAW, COURTS OF; JUDGES, etc.

Money, Weights, and Measures.—See POUND; MINT; WEIGHTS AND MEASURES.

Religion.—The United Kingdom is a Protestant state, but all religions—not offensive to public or private morals—may be professed, and their different forms of worship practiced, without interference from any quarter whatever. There are two churches "established" by special acts of the legislature. In England the established church is Episcopal in its government. In Scotland, on the other hand, the established church is Presbyterian. See SCOTLAND, CHURCH OF. According to the census returns of 1851 (in the returns of 1861 and 1871, religious statistics were not included, as the government shrank from re-opening a subject which had formerly given rise to much controversy), the number of places of worship, together with the sittings provided, in England and Wales, and the estimated number of attendants on a particular day, were as in the tables below.

Education.—In England, the chief institutions for education are the ancient national universities of Oxford and Cambridge; the more recent institutions of London, Durham, and Lampeter in Wales; the classical schools of Eton, Westminster, Winchester, Harrow, Charter-house, and Rugby; Owens college, Manchester, and other colleges and schools chiefly for physical science; the various military schools; the colleges of the dissenting denominations; the middle-class schools, either started by individual teachers, and hence called "adventure" schools, or by associated bodies acting as directors, to whom the teachers are responsible; and the schools of design.

ENGLAND AND WALES.	Places of Worship.	Sittings Provided.	Estimated Number of Attendants.
Established Church	14,077	5,317,915	3,773,474
Wesleyan Methodists (comprising seven distinct sects)	11,207	2,194,298	1,385,382
Independents or Congregationalists	3,244	1,067,760	793,142
Baptists (comprising six distinct sects)	2,789	751,343	587,978
Calvinistic Methodists	937	250,678	180,725
Scottish and Irish Presbyterians	161	86,812	60,131
Isolated congregations	539	104,481	63,572
Roman Catholics	570	186,111	305,393
Society of Friends	371	91,599	13,172
Unitarians	229	68,554	37,156
Latter-day Saints, or Mormons	222	20,783	18,800
Sandemanians	6	956	587
Jews	53	8,438	4,150
Brethren	132	18,529	10,414
Moravians	22	9,305	7,364
New Church	50	12,107	7,082
Apostolic Church	32	7,437	4,908
Foreign Protestant, Catholic, and Greek churches	16	4,457	2,612
Established Church	14,077	5,317,915	3,773,474
Other denominations	20,390	4,894,720	3,487,558
Total	34,467	10,212,635	7,261,032
SCOTLAND.			
Established Church	1,183	767,088	713,567
Free Church	889	495,385	438,363
United Presbyterians	465	288,100	273,554
Reformed Presbyterians	39	16,969	15,055
Original Seceders	36	16,424	15,781
Scotch Episcopalians	134	40,022	35,769
Independents or Congregationalists	192	76,342	70,851
Evangelical Union	28	10,319	10,589
Baptists	119	26,086	24,330
Wesleyan Methodists	82	22,441	21,768
Glassites or Sandemanians	6	1,068	890
New Church	5	710	630
Society of Friends	7	2,152	2,153
Roman Catholics	117	52,766	48,771
Unitarians	5	2,437	2,438
Isolated congregations	61	11,402	9,401
Moravians	1	200	200
Jews	1	67	67
Mormons	20	3,182	3,177
Apostolic Church	3	675	675
Established Church	1,183	767,088	713,567
Other denominations	2,212	1,067,717	975,482
Total	3,395	1,834,805	1,689,049

For primary education, a national system has now been established. Under the elementary education act for England, 1870, a popularly elected school-board is established in any district where the existing schools are deficient. Schools under the act are supported by school-rates and fees, and by parliamentary grants, varying according to the number of pupils, and their proficiency as tested by different standards of examination. They are to be open at all times to government inspection. It is left to the discretion of school-boards to make education compulsory.

Scotland possesses four universities for the higher branches of education—viz., those of Edinburgh, Glasgow, St. Andrews, and Aberdeen, besides a variety of minor colleges connected with the Episcopalian, free church, and other non-established churches. The Scotch education act, 1872, is modeled after the English act, but differs from it, by enacting that a school-board is to be elected in *every* parish and burgh: by making it illegal for parents to omit educating their children, between 5 and 13, in reading, writing, and arithmetic; and by comprehending higher-class schools. The number of day-schools to which annual grants are made in England and Wales, inspected in 1874, was 12,167; the daily average attendance throughout the year was 1,678,759; 2,034,007 scholars were present at inspection; 857,611 were examined; and 508,232 passed the prescribed tests. 1432 night schools were examined, with an average attendance of 48,690 scholars above 12 years of age. On the registers of the inspected schools were 2,497,602 children of whom 617,910 were under 6 years of age, 1,630,033 were between 6 and 12, and 229,659 were above 12. In Dec., 1874, there were 20,162 certificated teachers, 1999 assistant-teachers, and 27,321 pupil-teachers.

History.—On May 1, 1707, during the reign of queen Anne, the union of England and Scotland was formally accomplished. (For the previous history, see ENGLAND and SCOTLAND.) In the latter of these countries, the terms at first excited the utmost dissatisfaction, and even indignation; but the progress of time has shown it to be one of the greatest blessings that either nation could have experienced. The last years of queen Anne's reign were marked by the triumph of the tory party, headed by Harley and St. John (Oxford and Bolingbroke), who kept up a constant intrigue with the pretender, for the purpose of procuring his restoration. This treachery was defeated by the sudden death of her majesty in 1713. According to the act of settlement, she was succeeded by the elector of Hanover, who took the title of George I. The whigs then regained their ascendency, and, under the guidance of Walpole (q.v), now rising to eminence, at once proceeded to impeach the more important of the tory leaders. Other severities drove the more impatient of that party to attempt bringing in the pretender by force of arms. In 1715 the earl of Mar in Scotland, and the earl of Derwentwater in England, raised the standard of rebellion; both efforts, however, proved abortive, and were speedily crushed. Five years later, occurred the frightful catastrophe known as the south sea bubble, when the nation was saved from anarchy mainly by the exertions of Walpole. The latter now became premier and chancellor of the exchequer, and under him the commerce and manufactures of England continued steadily to advance, though little improvement was as yet perceptible either in Scotland or Ireland. George I. died in 1727, and was succeeded by his son George II. An attempt was again made by the tories to oust the whigs from power, but was frustrated by Walpole, who still continued the prime mover of public affairs. In 1739 after a peace of extraordinary duration, he was forced by popular clamor into a war with Spain, on account of some efforts made by that country to check an illicit trade carried on by British merchants in its American colonies. This war was feebly carried on, and ingloriously terminated; but the attention of England was speedily drawn towards the Austrian war of succession in which it was involved through the anxiety of the king for his Hanoverian possessions, and the strong antipathy of the people to the French. Walpole, disapproving of the war, was driven from office in 1743. George II. appeared on the field of battle himself, and at Dettingen proved himself a man of courage and spirit. But the success of the French at Fontenoy in 1745 paralyzed the efforts of England during the rest of the campaign; and in 1748, after nine years' fighting, a peace was concluded at Aix-la-Chapelle, by which it was agreed that both nations should mutually restore their conquests, and go back to exactly the same condition as they were in before the war! Meanwhile, a second attempt had been made (1745-46) by prince Charles Edward Stuart to win back the throne of his ancestors. This attempt, known as the second rebellion, was crushed at Culloden (April 16, 1746), and shortly after, a variety of important measures were passed by the imperial parliament relating to Scotland generally, and to the Highlands in particular, which had the effect, on the whole, both of conciliating the inhabitants, and of increasing their civilization. Now after a long period of indolence and poverty, Scotland began to make advances towards that equality with England, in respect of comfort and prosperity, which it has since attained.

In 1756 broke out the "seven years' war," in which Britain took the side of Frederick the Great against France, Austria, Russia, and Poland. It achieved no triumphs in Europe; on the contrary, it suffered a signal disgrace in the surrender of the duke of Cumberland, with 40,000 men, in Hanover; but in India, Clive deprived the French of most of their possessions, while Wolfe, in the new world, conquered their colony of Canada. In the midst of this war, George II. died (1760), and was succeeded by his grandson, George III., whose reign proved to be the longest and one of the most eventful

in the annals of British history. At this time the principal secretary of state was William Pitt, afterwards the great earl of Chatham; but the favor which George III. showed to the earl of Bute, a feeble and narrow-minded tory nobleman, rendered it necessary for the former to retire from office. Spain now joined France against Britain, as Pitt had foreseen and foretold; but fortune showered her brightest smiles upon the arms of the latter, and at the peace in 1763 she was allowed to retain many of the most valuable colonial possessions of both her antagonists. These wars, however, largely increased the national debt.

George III. now showed himself anxious to destroy the influence of the great whig families who had brought in the dynasty to which he belonged. The nation took the alarm, and for some time was strongly disaffected towards its sovereign, who was believed to be wholly under the influence of his Scotch premier, the earl of Bute. Popular indignation at last forced the latter to resign in 1763. His successor, Grenville, inaugurated his advancement to office by the prosecution for libel of Wilkes, the member for Aylesbury, who had made himself conspicuous by his attacks both on Bute and his royal master. The proceedings in this case lasted some years, and were attended with tumults of a serious nature, and a vehemence if not rancor of public feeling that indicated the magnitude of the discontent which prevailed. During the administration of Grenville, too, the first attempt was made to tax the American colonies by the passing of the stamp act in 1765. Against this the colonies protested, and the succeeding whig ministry of Rockingham repealed it. This ministsy, however, was of short duration, and was replaced by one formed by Pitt, now created earl of Chatham. The necessity for an increase of the finances led to another attempt at American taxation, and an act for imposing duties on the imports of tea, glass, and colors was passed. This measure excited the most determined opposition among the colonists; and finally, in 1774, war broke out between them and the mother-country, which lasted eight years, and in which the former were supported by France, Spain, and Holland. It resulted in the acknowledgment of their independence, and in the formation of the republic of the United States (1783). During almost the whole of this unhappy contest, the ministry of lord North directed the policy of the country; and it was only the success of a vote for the conclusion of the war that forced them to resign early in 1782. It was followed by the second Rockingham ministry, and that soon after by the Shelburne ministry, only remarkable for the appearance in it of the younger Pitt. The lukewarm whiggism of lord Shelburne gave offense to Fox and other more advanced political thinkers; the result was a coalition of the Foxites with the followers of lord North. This coalition, factious and unprincipled in the last degree, triumphed, and under the name of the coalition ministry, held the seals of office during the year 1783. Fox's *India bill*, the purpose of which was virtually to transfer the government and patronage of India from the East India company to the house of commons, was the cause of its ruin. This bill was considered by the king to aim at fixing the ministry in power beyond the control of both himself and the people, and having induced the house of lords to reject it, he compelled the ministry to resign. Pitt was then appointed prime minister and chancellor of the exchequer. See PITT. In 1786 commenced the trial of Warren Hastings, who was impeached by the whig leaders, Fox, Burke, and Sheridan, but was ultimately acquitted. Meanwhile, the progress both of England and Scotland was unquestionable; manufactures increased, agriculture improved, and—especially in Scotland—an interest in the discussion of political and other questions of importance spread through the community, as may be seen very clearly in the poetry of Robert Burns. The French revolution (1789) at first strengthened this interest, but the excesses of the reign of terror produced a decided reaction; and for many years all classes, at least all the so-called "respectable classes," were fanatically averse to the slightest innovation. In 1793 the ministry of Pitt, without any real cause, declared war against the French republic, in spite of the opposition of Fox and Sheridan. This contest lasted till the peace of Amiens in 1801, and was, on the whole, very disastrous to Great Britian, except at sea, where the victories of Howe of Brest, Jervis off cape St. Vincent, Duncan off Camperdown, and Nelson in Aboukir bay, served to sustain the spirit of the nation. Other features of the time were the *threatened* invasion of Britain by the French, which called forth volunteer corps in every part of the island; the Irish rebellion, which, though assisted by a French force, proved a failure; and the trial and condemnation at Edinburgh of the popular reformers, Mure, Palmer, etc. Pitt, who had left office just before the peace of Amiens, was succeeded by Addington, who was compelled to renew the war with Bonaparte in 1803, on account of the way in which the latter evaded fulfilling the conditions of that peace. Again, Bonaparte threatened to invade the country, and collected an immense flotilla at Boulogne, professedly for that purpose, in 1803, but was completely kept in check by Nelson. The battle of Trafalgar in 1805, nearly annihilated the navy of France and Spain. But on land, the arms of France were victorious; and the battle of Austerlitz (1805) broke up most effectually that coalition of continental powers against France which Great Britain had fostered and formed. The shock of this disaster gave a death-blow to Pitt, who expired in the beginning of 1806, and was followed to the grave in the autumn of the same year by his rival, Fox. The overthrow of Prussia at Jena and Auerstadt, and of Russia at Friedland, placed Great Britain in a most perilous predicament. All the nations of Europe were compelled by Bonaparte to exclude British mer-

chandise from their ports, and the island of Great Britain itself was declared in a state of blockade. Secure, however, in the protection of her invincible navy, she bore up bravely against her terrible isolation, increased her intercourse with her own vast colonies, ruined the commerce of her enemies, and never ceased her efforts to undermine the influence of her great enemy on the continent. The first people that showed a tendency to revolt against the arrogant tyranny of Bonaparte were the Spaniards. Great Britain at once offered to assist them with arms and money, and in 1808 a force was landed in Portugal, under the command of sir Arthur Wellesley, afterwards duke of Wellington. The war which ensued (known as the "peninsular war") lasted till 1814, and ended in the French being driven back in disorder into their own country at Toulouse. Meanwhile, ruin had overtaken the French army in Russia; Austria, Prussia, and Russia had combined with Great Britain against Bonaparte; and in 1814 the allies entered Paris, and the French emperor was forced to abdicate, and retire to Elba. His return in 1815 once more threw Europe into disorder and agitation; but his power was finally shattered at Waterloo by Wellington and Blucher, and peace restored to Europe. The contest had cost Britain (which had to subsidize most of her allies) an enormous expense. See DEBT, NATIONAL.

Now that the long conflict between France and Europe was over, the thoughts of the people were again turned to the question of political reform. Four years of extraordinary mercantile depression, which followed the victory at Waterloo, partly resulting from bad harvests, and partly from Great Britain's having ceased to enjoy that monopoly of commerce which she did during the war, had made the people discontented, and the shameful massacre of the Manchester operatives in St. Peter's fields by the yeomanry in 1819—commonly known as the Peterloo massacre—excited strong indignation; but a horror of anything revolutionary still possessed the upper and a large section of the middle classes, and severe measures were passed with a view to the suppression of discontent among the working-classes. In 1820 George III. died, and was succeeded by his eldest son, George IV. The trial of his consort, queen Caroline, which occurred in the same year, shattered his popularity, which was never very great. The commercial reforms of Huskisson, supported by Canning, which marked the next two years, added immensely to the prosperity of Great Britain, and capital grew so abundant, that a vast number of joint-stock companies were formed, as a means of giving it a wider range. Many of their projects for traffic in remote countries were quite visionary, and ended disastrously, involving in ruin (between Oct., 1825 and Feb., 1826) fifty-nine English provincial banks, and inflicting the greatest misery upon the working-classes. About the same time, the Irish Catholics began to clamor for emancipation from their civil disabilities. The older and more inflexible tories, who were still dominant in parliament, opposed it; but the intense determination of the Irish people, and the powerful eloquence of their champion, Daniel O'Connell, at last prevailed, and in 1829 the ministry of Wellington, yielding to the storm, itself proposed and carried the measure. In 1830 George IV. died, and was succeeded by his brother, William IV. The outburst of the July revolution in France quickened the paces of British reformers; the demand of the nation for an improvement in the parliamentary representation became very strong; and in Nov., 1830, after an exclusion from office of nearly half a century, the whigs once more ascended into power "on the breath of popular applause," and the ministry of earl Grey immortalized itself by passing the "reform bill." Another of its claims to the respect and gratitude of posterity was the abolition of slavery in the British colonies (1834). The reform of the English poor-law, and in the mode of electing municipal authorities in Scotland, also deserves mention; but in 1834 the whig ministry was dismissed by the sovereign. Sir Robert Peel now became premier, but the whigs were still in a majority in the house, and Peel was compelled to resign. The Melbourne administration which followed carried several small though beneficial measures of reform, but it failed to secure the attachment of the people. The lower classes were becoming radical and chartist, while the middle classes, contented with the political power which the reform bill had secured to them, were growing apathetic, and in many cases, from dread of the masses, were leaning towards toryism. In the midst of these perplexities, William IV. died in 1837, and was succeeded by his niece, the princess Victoria, the present ruler of the united empire. In 1841 the whig ministry succumbed to a vote of "no confidence," and sir Robert Peel once more assumed the helm of state. The principles of free trade now began to be actively advocated; public opinion was leavened by the platform addresses of Mr. Cobden and Mr. Bright, until the prime minister himself was finally converted, and in 1846 carried, what he had long opposed, a measure for the abolition of the *corn-laws*. Three years before the abolition of the corn-laws, a great religious schism took place in the established church of Scotland, and led to the formation of a body calling itself the "Free church of Scotland" (q.v.). Other important incidents of this period were the Chinese and Afghan wars; the chartist agitation, which reached its climax in the monster petition of 1848, got up by Feargus O'Connor and his friends; the series of failures in the potato-crop of Ireland, involving that country in terrible misery, and inundating Great Britain with paupers. Sir Robert Peel was succeeded in the government of the country by lord John Russell, who did not prove as popular a minister as was anticipated, and in 1852 the old tory party returned to power, headed by the earl of Derby and Mr. Disraeli. It

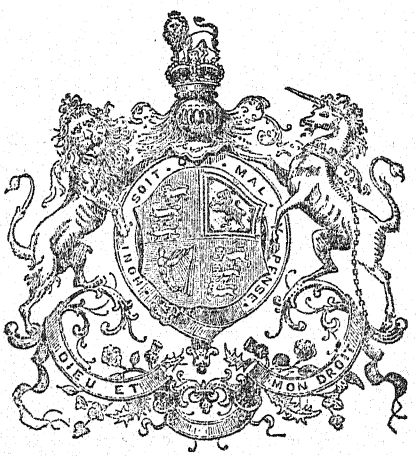
was, however, beaten on its budget, and forced to resign in less than a year, when its place was taken by the coalition cabinet of lord Aberdeen. During the ministry of this nobleman, the *Crimean war* began (1854); but as lord Aberdeen was considered to be somewhat pro-Russian in his likings, he was obliged to make way for lord Palmerston in 1855. Two years later (May, 1857), the Indian mutiny broke out, and the energies of the government were taxed to the utmost to suppress it, but were eventually crowned with complete success. Never did British soldiers exhibit equal heroism, both physical and moral. From 1855 to 1865 (excepting for a brief interval, when lord Derby returned to office), the government was in the hands of lord Palmerston. During this period England carried on a successful war against China, and the volunteer movement was begun. The American war caused great distress among our operatives. In 1861 prince Albert died. In 1866 earl Derby was at the head of affairs: Britain was united to America in that year by the submarine telegraph, and the Fenian insurrection occurred. The year 1867 was marked by the passing of a conservative reform bill, which added more than half a million electors to the constituency of Great Britain; and by the expedition against Abyssinia, under sir Robert Napier, which, in 1868, resulted in the destruction of Magdala, and death of king Theodore. During the government of Mr. Disraeli, who succeeded lord Derby, Scotch and Irish reform bills were passed, and an act discontinuing public executions. In 1869 Mr. Disraeli having resigned, an act was passed by the liberal government under Mr. Gladstone, for disestablishing the Irish church. The years 1870 and 1872 produced the education acts for England and Scotland. In 1873—1874 the Ashantee (q.v.) war was carried on to a successful termination; and the latter year witnessed the establishment of a conservative government under Mr. Disraeli.

GREAT BRITAIN, Royal Arms of. The arms of the united kingdom of Great Britain and Ireland are borne by her majesty queen Victoria. Quarterly, first and fourth gules, three lions passant gardant in pale, or, for England; second, or, a lion rampant within a double tressure flory counterflory gules, for Scotland; third azure, a harp or, stringed argent, for Ireland; all surrounded by the garter.

Crest.—Upon the royal helmet, the imperial crown proper, thereon a lion statant gardant or, imperially crowned, also proper.

Supporters.—Dexter, a lion rampant gardant or, crowned as the crest. Sinister, a unicorn argent, armed crined, and unguled or, gorged with a coronet composed of crosses patée and fleur-de-lis, a chain affixed thereto, passing between the fore legs, and reflexed over the back, also or.

Motto.—*Dieu et mon Droit* in the compartment below the shield, with the union rose, shamrock, and thistle ingrafted on the same stem.



Royal Arms of Great Britain.

Arms have been ascribed by heralds to the Saxon and Norman monarchs of England in the 10th and 11th centuries; but as heraldry was, in point of fact, unknown till the middle of the 12th c., they must be dealt with as fabulous. However, at a period almost before the earliest dawnings of hereditary coat-armor, the sovereigns of England, in common with various other monarchs of christendom, adopted the lion as their device. Richard I., in his earliest seal, has two lions, which are borne counter-rampant; but in the latter part of his reign, after his return from the third crusade, the great seal of cœur-de-lion represents the three lions in pale and passant gardant, as they have been almost uniformly depicted since. The only subsequent instance of which we are aware of any variation in the number is on a seal of the Carmelites at Oxford, in which Edward III. is represented in a surcoat charged with four lions in pale passant gardant, a proof of the latitude which heralds occasionally allowed themselves as late as the beginning of the 14th century. In 1340 Edward III., in virtue of the supposed right of his mother, assumed the title of king of France, and quartered the arms of France with those of England, giving to the former the precedence. The fleurs-de-lis were then generally borne *sans nombre;* but in the latter part of the reign of Henry IV. they were reduced to three, borne or on a field azure. No further change took place in the royal escutcheon until the time of James I., except that Mary, on her second great seal, made after her marriage with Philip II., impaled the arms of Spain and England.

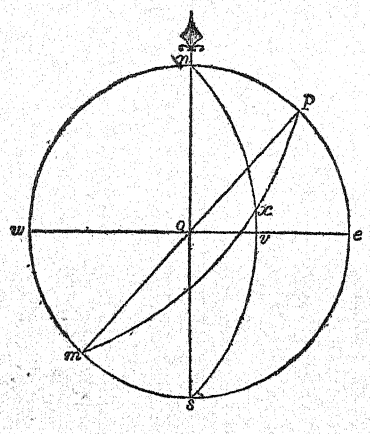
James VI. of Scotland, on succeeding to the throne of England, quartered the arms borne by preceding sovereigns with those of Scotland and Ireland, the first and fourth

quarters being France and England quartered as before, the second quarter the lion rampant of Scotland within the double tressure (see SCOTLAND, ARMS OF), and the third quarter the harp of Ireland (see IRELAND, ARMS OF). The royal arms were similarly borne by all the sovereigns of the house of Stuart till the reign of Anne, except that William III. bore over all the coat of Nassau (az. semé of billets, a lion rampant or) on an escutcheon of pretense. In the reign of Anne, the legislative union with Scotland brought about a material change. England and Scotland impaled were placed in the first and fourth quarter, France in the second, and Ireland in the third. The accession of George I. displaced England and Scotland from the fourth quarter, to make way for the arms of his majesty's German dominions. These were gu. two lions passant gardant in pale for Brunswick, impaled with or, semé of hearts gu. a lion rampant az., for Lüneburg, having the arms of *ancient* Saxony—viz., gu. a horse courant ar. enté en base, and in a shield surtout gu. the crown of Charlemagne proper, being the badge of the arch-treasurer of the holy Roman empire. A further alteration took place on the union with Ireland, when George III. laid aside the titular assumption of king of France, and abandoned the French ensigns. The arms of England were now made to occupy the first and fourth quarter, Scotland the second, and Ireland the third, while the German ensigns were relegated to an escutcheon of pretence. These last were finally abandoned on the severence of Hanover from the crown of Great Britain, which took place on the accession of queen Victoria, and the royal escutcheon thus assumed its present arrangement.

From the union of the crowns of England and Scotland under James I., up to the union of the kingdoms in 1707, the royal arms were somewhat differently marshaled in Scotland, Scotland being allowed in all Scottish seals, ensigns, and arms to occupy the first and fourth quarter, and England the second, while the whole were ensigned with the crown of Scotland; but the act of union of 1707 recognizes no royal ensigns but those of the United Kingdom, which are to be "such as her majesty shall think fit;" and by 39, 40 Geo. III. c. 67, on the union with Ireland, it was enacted that the armorial bearings of the United Kingdom "shall be such as his majesty by his royal proclamation under the Great Seal of the United Kingdom shall be pleased to appoint." The practice, which prevails to a certain extent in Scotland, of giving the precedence to the Scottish lion in the royal shield, is incorrect, though the error has been committed in several of the official seals of the kingdom.

The lion passant as the *crest* of England first appears on the Great Seal of Edward III.

The *supporters* borne in former times by the kings of England varied much, particularly during the earlier period when these appendages of the shield were invested with more of a decorative than a heraldic character, and perhaps often left to the fancy of the engraver. When the arms of any of the English sovereigns from Richard II. to Edward IV. are represented with supporters, the animals selected are almost indifferently lions, antelopes, or white harts, and occasionally their place is supplied by angels. Edward IV.'s shield is sometimes supported on one side by a black bull, and Richard III.'s in one instance—in a MS. in the British museum—on both sides by white boars. During the reigns of Henries VII. and VIII., Edward VI., Mary, and Elizabeth, the lion, red dragon, and greyhound were the supporters most in vogue, and as the herald or engraver had it not in his power to represent all three at once, he seems to have been allowed to select any two at pleasure. James I. for the first time clearly defined the royal supporters, adopting the lion of England and unicorn of Scotland as they have ever since been borne, the unicorn having been, up to 1707, allowed the precedence in Scotland.



the computation of a spherical triangle. under the head of SPHEROGRAPH (q.v.).

GREAT CIRCLE or TANGENT SAILING. In order to have a clear idea of the advantages of great circle sailing, it is necessary to remember that the shortest distance between two places on the earth's surface is along an arc of a great circle (see SPHERE), for instance, the shortest distance between two places in the same latitude is not along the parallel of latitude, but along an arc of a circle whose plane would pass through the two places and the center of the earth. The object, then, of great circle sailing is to determine what the course of a ship must be in order that it may coincide with a great circle of the earth, and thus render the distance sailed over the least possible. This problem may be solved in two ways, either by means of an instrument called the "spherograph," or by The first of these methods will be explained The method by computation will be under-

stood from the accompanying diagram: *nwse* represents a meridian which passes through the place *p*, *nxes* another meridian through the place *x*, and *pxm* a portion of a great circle; let *p* be the place sailed *from*, and *x* the place sailed *to*, then *px* is the great circle track, and it is required to determine the length of *px* (called the distance), and the angle *xpe* which it makes with the meridian (called the course). To determine these two, we have three things given: *nx*, the co-latitude of *x*; *np*, the co-latitude of *p*; and the angle *xnp*, which, measured along *we*, gives the difference of longitude. The problem thus becomes a simple case of spherical trigonometry, the way of solving which will be found in any of the ordinary treatises on the subject of spherical trigonometry.

From the theory of great circle sailing, the following most prominent features are at once deduced: *A ship sailing on a great circle makes straight for the port, and crosses the meridians at an angle which is always varying*, whereas, by other sailings, *the ship crosses all meridians at the same angle*, or, in nautical phrase, *her head is kept on the same point of the compass*, and *she never steers for the port direct till it is in sight.* As Mercator's chart (q.v.) is the one used by navigators, and on it the course by the ordinary sailings is laid down as a straight line, it follows, from the previous observations, that the great circle track must be represented by a curve, and a little consideration will show that the latter must always lie in a higher latitude than the former. If the track is in the northern hemisphere, it lies nearer the north pole; if in the southern hemisphere, it is nearer the south pole. This explains how a curve line on the chart represents a shorter track between two places than a straight line does; for the difference of latitude is the same for both tracks, and the great circle has the advantage of the shorter degrees measured on the higher circles of latitude. Consequently, the higher the latitude is, the more do the tracks differ, especially if the two places are nearly on the same parallel. The *point of maximum separation*, as it is called, is that point in the great circle which is furthest from the rhumb-line on Mercator's chart. Since the errors of dead-reckoning (q.v.) prevent a ship from being kept for any length of time on a prescribed track, and thus necessitate the calculation of a new path, in practice, the accurate projection of a great circle track on the chart would be a waste of time. In general, it is sufficient to lay down three points—the place sailed from, the place sailed to, and the point of maximum separation, and through these points to draw an arc of a circle. As the rhumb-line and great circle track between two places, one in north latitude and the other in south latitude, cross each other at the equator, in this case there will be two *points of maximum separation*, and the course and distance must be calculated for each side of the equator separately. Many ignorantly object to great circle sailing on the ground that, on account of constant change of bearings, a ship cannot be navigated on the correct course; but, in fact, all that is required of a navigator is to sail as near to his great circle track as convenient; and each separate course will be a tangent to his track, and the shorter these tangents are made, the more will the length of a voyage be diminished. We may here mention that a chart constructed on the *gnomonic projection* (q.v.) represents all great circle tracks as straight lines. See NAVIGATION.

GREAT EASTERN. The mightiest ship in the world has had an eventful history, marked in its earlier years by a large share of disaster. In 1852 an "Eastern Steam Navigation Company" was formed, to maintain an ocean steam-route to the east round the cape of Good Hope. In 1853 the directors came to a conclusion that, owing to the cost of maintaining coaling-stations on the way, such a route would not pay unless the ship could carry coal enough for the voyage out and home, besides a large number of passengers and a great cargo. Mr. Brunel was employed to plan, and Mr. Scott Russell to build, a vast steamer that would meet these requirements. The scheme was for a ship that would accommodate 1000 passengers, 5,000 tons of merchandise, and 15,000 tons of coal for fuel. Its arrangements (setting aside later alterations) were briefly as follows: Length, 680 ft. between perpendiculars, or 692 ft. upper deck; breadth, 83 ft., or 118 over paddle-boxes; height of hull, 60 ft., or 70 to top of bulwarks. Bottom flat for 40 ft. in width, without keel. Framework of 35 ribs or webs of plate-iron, 3 ft. deep, immensely strengthened, and extending from end to end of the ship, at 3 to 5 ft. apart; and cross-webs, of similar strength, connecting these at intervals. A double wall or skin of iron plate, outside and inside those ribs, thereby converting the whole hull into a cellular structure, like the top and bottom of the Menai Britannia tubular bridge. The plates for this purpose were 10,000 in number, some of them 28 ft. long. The cellular structure was continued along the bottom and about 5 ft. up the side, and any one of the cells thus formed could be filled with water. Ten partitions of plate, cross-wise of the ship, divided the interior into 11 water-tight compartments, further sub-divided by longitudinal partitions. The propelling power comprised both paddle and screw. The paddle-engines had 4 boilers, each with 400 brass flue-tubes; there were 4 engines (made by Scott Russell at Millwall), with cylinders of 14 ft. stroke, and 74 in. diameter; the paddle-wheels were 56 ft. diameter by 13 deep, with 30 spokes or radii. The screw-engines (made by Boulton and Watt at Soho) had 6 boilers; the 4 engines had cylinders, each 4 ft. stroke by 84 in. diameter, with piston-rods 7½ in. thick; the propeller-shaft was 160 ft. long, and in some parts 24 in. diameter, with a screw propeller at one end 24 ft. in diameter. The coal-bunkers, to supply all the furnaces, would contain 14,000 tons; the smoke from the furnaces ascended 5 funnels, 100 ft. high by 6

in diameter; each of the 10 boilers, when full of water, weighed 100 tons; the steam was conveyed from the boilers to the engines through a pipe 45 in. diameter. Setting aside the nominal power, all the 8 engines, at full force, were estimated to work up to 11,000 horse-power. There were 6 masts, 5 of them iron, carrying 7,000 yards of sail as auxiliary to the steam-power; the masts, yards, gaffs, and large spars were mostly of iron plate, strengthened inside in various ways; the shrouds and standing-rigging were of iron-wire ropes; the anchors, 10 in number, were some of them 10 tons each; the chain-cables were, collectively, a mile long, with links of 50 lbs. each. The vast wall-sided compartments of the ship had facilities for conversion into cabins for 800 saloon passengers, 2,000 second-class, 1200 third-class, and 400 officers and crew; or 5,000 might have been accommodated in all, if emigrants or troops. The height of the 'tween decks was 13 ft.; and all, whether for first, second, or third class passengers, were more lofty than known in any other ship. Such were the plans for the mighty ship; they were never fully carried out in all their details, owing to numerous alterations and refittings; nevertheless, the description faithfully conveys an idea of the general characteristics. The curvatures of the hull, in length, breadth, and height are shown by diagrams in SHIP-BUILDING.

Twenty years of the ship's history present a singular series of vicissitudes. During 1854–57, the operations proceeded at Millwall, under frequent and heavy financial pressure, which taxed the resources of the company severely; while the engineer and builder were frequently called upon to surmount difficulties of almost unparalleled kind. By Nov., 1857, the ship had advanced to the launching condition. In order to avoid the danger of launching such a long vessel stern foremost, the ship was built with the broadside towards the river, on a timber foundation of immense strength, with sloping ways, or rails, down to the water. Either the ship was too heavy (12,000 tons), or the slope was too gradual; for it required various attempts, between Nov. 3, 1857, and Jan. 31, 1858, and an expenditure of £60,000, to effect the launching. During 1858 and 1859, the work continued as fast as the company could supply money. Uncertain how far the original intention of a trade to and from Australia could be realized, the directors determined on a trial trip across the Atlantic. It was a disaster. The ship left the Thames, Sept. 8, 1859; an explosion of steam-pipes took place off Hastings; seven persons were killed and several wounded; and the voyage abruptly came to an end at Weymouth. Mr. Brunel died immediately after his vast ship had made this her first but futile attempt to brave the ocean. After a winter and spring spent in costly repairs, acrimonious recriminations, and suits in law and equity, the ship started again on June 17, 1860. Leaving Southampton on that day, she crossed the Atlantic in 11 days, and reached New York on the 28th. During the remainder of 1860, and the greater part of 1861, she made many voyages to and fro, losing money by the insufficiency of the receipts to meet the current expenses, and constantly required repairs. In Dec., when political relations with the United States looked ominous, the *Great Eastern* served as a troop-ship, carrying some battalions of foot guards over to Canada with a degree of comfort never before experienced by 2,000 human beings in one ship.

The years 1862 to 1864 were nearly a blank as concerns the history of the *Great Eastern*. No attempt was made at a voyage to Australia and back; the trips across the Atlantic had not been remunerative; the government did not often require the services of so vast a fabric as a troop-ship; and the company were always embarrassed by overhanging debts. In 1864 negotiations were entered into with the Atlantic Telegraph company and the Telegraph Construction and Maintenance company, for the employment of the *Great Eastern* as a cable-laying ship. The passenger accommodation was wholly removed from the interior, to make room for the enormous iron tanks in which the cable was stowed. The arrangement and services of the ship in 1865 and 1866 will be found briefly noticed under ATLANTIC TELEGRAPH. In 1867 when the Paris international exhibition was approaching completion, a body of speculators chartered the *Great Eastern* for a certain number of months, to convey visitors from New York to Havre and back again—under the expectation that the number of such visitors would be so vast as to defray the whole of the expenses, and yield a large profit. A great outlay was incurred to reconvert the vessel from a cable-laying to a passenger ship, and for extensive renewals of machinery. The ship started from Liverpool for New York in May; but the speculation proved an utter failure, there being neither wages for the seamen and engineers, nor profit for the speculators.

In 1868 a new arrangement was made, by which the ship was to be permanently chartered by the Telegraph Construction and Maintenance company. The name, which had been changed from *Leviathan* to *Great Eastern*, and then to *Great Ship*, was again changed to *Great Eastern*. The passenger fittings, introduced in 1867, were removed, and everything arranged for the important work of submarine cable-laying. This has proved to be an advantageous mode of employment. Between 1869 and 1874 the *Great Eastern* successfully laid some of the most important telegraphic cables—across the Atlantic, in the Mediterranean, in the Red sea, across the Indian ocean, across the equator from Europe to Brazil, etc.

GREAT FALLS, a village partly in the town of Somersworth, in Stratford co., N. H., but reaching over into Maine, on the Portsmouth, Great Falls and Conway, and

a branch of the Boston and Maine railroads, 5 m. n. of Dover; pop. estimated at 4,000. The cotton factories employ 3,000 persons, and use yearly 7,700 bales. There are also woolen and other manufactories, a town hall, high school, etc.

GREAT FISH RIVER is the name of two streams in opposite extremities of the British empire.—1. Great Fish river in Cape Colony rises in the Snowy mountains; and, after a generally south-eastern course of 230 m., it enters the Indian ocean, in lat. 33° 25′ s. and long. 27° e., having at its mouth a bar, which renders it inaccessible to any decked vessel.—2. Great Fish river of British North America, known chiefly as the route of Back and King in search of Ross, enters an inlet of the Arctic ocean, in lat. 67° 8′ n., and long. 94° 40′ w., after a n.e. course, the length of which, however, has not yet been ascertained. Its character is as unfavorable as its position to navigation and commerce.

GREAT GRIMSBY. See GRIMSBY, GREAT, *ante*.

GREAT KANAW'HA, a considerable river of North America, and an affluent of the Ohio, is called New river in the upper part of its course, and rises in the n.w. of the state of North Carolina, between Blue ridge and Iron mountain. It flows first n.e. for upwards of 100 m. between parallel mountain-ranges, then turning n. and n.w., it breaks through several ridges of the Alleghanies, and continues to flow in a n.w. direction to its junction with the Ohio at Point Pleasant, after a course of about 400 miles. About 100 m. from its mouth, on being joined by the Gauley river, it takes the name of the Great Kanawha; and 2 m. lower, its course is marked by a remarkably picturesque fall of about 50 feet. Up to this fall, the river is navigable.

GREAT MAR'LOW, a municipal and parliamentary borough in Buckinghamshire, finely situated on the n. bank of the Thames, in lat. 51° 34′ n., and long. 0° 46′ w., 31 miles n.w. of London. The Thames is here crossed by a suspension-bridge (constructed in 1835), which has a span of 225 feet. The principal manufactures are silk, lace, and paper. Great Marlow returns one member to parliament. Pop. in '71, 6,627.

GREATOREX, ELIZA, b. Ireland, 1820, daughter of J. C. Pratt, a Wesleyan minister; wife of Henry W. Greatorex, son of the organist of Westminster abbey. She came to America in 1839. In 1854–56 she studied painting in New York, and in 1862 studied in Paris. In the interim she visited Ireland and England. About 1868 she began a series of sketches of historical edifices and scenes in and around New York. She was in Germany in 1870 and the following years, where she published *The Homes of Oberammergau*. Returning to the United States she published *Summer Etchings in Colorado*, and other works. Her latest work contains illustrations inland near New York.

GREAT PEDEE RIVER. Its sources are in the Alleghany mountains in n.w. North Carolina, whence it flows s.e., under the name of the Yadkin river, till its junction with the Rocky river in the s. part of the state; then, under the name of the Great Pedee, continues in a s.e. direction through South Carolina, receiving the affluents Little Pedee and Waccamaw, and empties into Winyaw bay. It is navigable for steamboats to Gardner's bluff, over 100 m. from its mouth, and for sloops 150 m., to the falls at Cheraw.

GREAT SALT LAKE, a remarkable and extensive sheet of water in the n. of Utah territory, North America, has given name to the Salt Lake city (q.v.), the Mormon metropolis, which is situated at its south-eastern extremity. It lies in one of the great valleys or basins of the Rocky mountains, and is about 70 m. long and 30 m. broad, yet its average depth is only 7 or 8 ft., and it nowhere exceeds a depth of 33 feet. Its surface is 4,200 ft. above the level of the sea. In the middle of the lake several islands rise as high as 3,250 ft. above the level of the water; the principal island is in lat. 41° 10′ n., and long. 112° 21′ west. The islands are 9 in number, one of them is 12 m., and another 16 m. in length. The water of the lake is so salt as to form one of the purest and most concentrated brines known in the world. It contains 22 per cent of chloride of sodium, slightly mixed with other salts. This lake, in whose waters no living creature is found, receives from the s., by the Jordan, the waters of the Utah lake, which are fresh, and those of the Wear river from the n.; but it has no outlet. It has been called the "still innocent dead sea;" and certainly in the quality of the water, and the wild, weird aspect of the surrounding scenery, the lakes greatly resemble each other. The first mention of the Great Salt Lake was by baron La Hontan, in 1689, who did not himself visit it, but who gathered some notions of it from the Indians w. of the Mississippi. It was first explored and described in 1843, by col. Fremont. A thorough survey was made in 1849–50, by capt. Howard Stansbury, of the U. S. army, whose report was printed in 1852. See SALT LAKE CITY, and UTAH.

GREAT SEAL. By act of union between England and Scotland (5 Anne, c. 8), one great seal for the United Kingdom of Great Britain is used for sealing writs to summon parliament, for treaties with foreign states, and all public acts of state affecting Great Britain. The holder of the great seal is now generally called the lord chancellor. A seal is also kept in Scotland for sealing grants and writs affecting private rights there. By the law of England, the lord chancellor has the custody of lunatics, which is a *quasi* judicial power; but he has no authority to act in this capacity in Scotland, where a

similar authority is vested in the court of session. As regards Ireland, the act of union, 39 and 40 Geo. III., c. 67, provided that various acts as to summoning parliament, etc., should be done under the great seal of the United Kingdom; but in other respects, the great seal of Ireland is used in the same manner as before the union.

GREAT SLAVE LAKE, an extensive and irregular sheet of water in British North America, is situated in lat. between 60° 40′ and 63° n., and in long. between 109° 30′ and 117° 30′ west. Its greatest length is about 300 m., and its greatest breadth 50 miles. It is surrounded, especially on the n., by rugged and precipitous shores; it contains many islands, some of them wooded, and is wholly frozen over for six months of every year. On the n., it receives the surplus waters of lake Aylmer and lake Artillery, and on the s., those of lake Athabasca. Its own surplusage of water is carried off by the Mackenzie river to the Arctic ocean.

GREAT SLAVE RIVER, a river of British North America, forms the outlet of lake Athabasca into Great Slave lake, and flows in a n.w. direction from the former to the latter. It is about 300 m. in length; its banks in many parts are well wooded; and its course, which in the upper part is interrupted by falls and rapids, lies through an alluvial region in the lower part.

GREAT WALL OF CHINA. See CHINESE EMPIRE.

GREAVES (Fr. *grève*), pieces of armor formerly used as a defense for the legs (in the patois of Burgundy, *grève* still signifies "shin.") They were originally made of leather, quilted linen, etc., and afterwards of steel, hollowed to fit the front of the legs, and fastened with straps behind. The Greeks termed them *knēmides* (whence the frequent expression in the *Iliad, euknēmides Achaioi*, the "well-greaved Greeks"), and the Romans *Ocreæ.*

GREAVES, JOHN, 1602–52; b. England; educated at Oxford, and lecturer on geometrical science in a London college. He traveled in Europe and Egypt with a view of studying the pyramids, and in his journey collected many valuable manuscripts, gems, and coins. He was subsequently a prof. of astronomy at Oxford. Among his works were a *Discourse on the Roman Foot and Denarius,* a Persian grammar, and an unfinished dictionary of the same language.

GREBE, *Podiceps*, a genus of birds of the family *Colymbidæ*, having the feet webbed not in the usual manner, but by a separate membrane for each toe, united only at the base. The tarsi (shanks) are so much compressed as to be almost like blades. The claws are large and flat. The bill is about as long as the head, straight, and conical. The wings are short. There is no tail. The legs are attached so far back, that the birds when on land assume an erect position, like penguins. They walk with difficulty, and all their motions on land are awkward. They sometimes shuffle along on their bellies like seals. But in water they are extremely agile; they swim rapidly, dive with extreme quickness if alarmed, and pass to very considerable distances under water, moving there by means of their feet alone, and threading their way with wonderful expertness among the stalks and leaves of aquatic plants. They feed on fishes, batrachians, crustaceans, and other aquatic animals, partly also on vegetable food. They are said sometimes to carry their young under their wings, and even to take them under water with them in diving to escape from enemies. The geographical distribution of the genus is very wide, and some of its species are also very widely distributed. Four species are British, two of which are only winter birds of passage; but the GREAT-CRESTED GREBE (*P. cristatus*), and the LITTLE GREBE (*P. minor*), also called DABCHICK or DOBCHICK, are resident all the year. The little grebe is by far the most common British species. It does not exceed 10 in. in length. The great-crested grebe is rare, even in winter, when the number is increased by visitants from the north. It is sometimes called the SATIN GREBE, from the beautiful shining silvery feathers of the lower parts of its body, on account of which it is in great request, the skin being used to make muffs for ladies, or cut into narrow strips for trimming their dresses. Grebe-shooting is a favorite amusement on the lake of Geneva; the grebe is pursued by a boat, whilst it seeks to escape by diving and swimming under water. The males of some of the grebes have the head finely ornamented with tufts. The plumage of most of them varies much at different ages and seasons.

GRECIAN ARCHITECTURE. The origin of the architecture of Greece is, like the origin of every art and science in that country, mixed up with mythical and fabulous history. It is divided into three styles, and each of these has its mythical origin. Thus, the Doric is said to have been copied from the early wooden huts of the aborigines; the Ionic, which sprang up among the Greek colonists in Asia Minor, to have been modeled on the graceful proportions of the female figure, as the Doric had been on the more robust form of a man—the volutes representing the curls of the hair, the fluting of the folds of the drapery, etc. The story of the origin of the Corinthian style is very pretty: a nurse had deposited in a basket on the grave of a departed child the toys she had amused herself with when alive. The basket was placed accidentally on the root of an acanthus, and in spring, when the leaves grew, they curled gracefully round the basket, and under a flat stone which was laid on the top of it. Callimachus, the sculptor, see-

ing it, caught the idea, and worked out at Corinth the beautiful capital since called after that city.

Modern discoveries have, however, shown that Greece owed much to the earlier civilization of the countries which preceded it in history. To the architecture of one or other of these, almost every feature of Greek architecture can be traced. But it is for the first idea only that the Greeks are indebted to Egypt and Assyria; whatever forms they adopted, they so modified and improved as to make them part of their own architecture.

Grecian architecture is divided into three styles—the Doric, Ionic, and Corinthian (see COLUMN, figs. 4, 5, 6). Of these the Doric is the oldest. The earliest example which remains is the temple at Corinth, which was built about 650 B.C. The remains of this temple show the various members of the style fully developed, but they are all of a massive and heavy description, strongly resembling in this respect their prototype, the architecture of Egypt. There is now no doubt, although the intermediate steps are lost, that the Doric style took its origin from the rock-cut tombs of Beni-Hassan (q.v.) in Egypt. The pillars of one of these tombs appear at first sight to be Doric; it is only on close inspection that we find that the Echinus (q.v.) is wanting under the capital. The echinus was, however, used by the Egyptians. We here find ourselves in the cradle of Greek art. This is the spot where we must seek for the first origin of the style, not in Greece, where the earliest example is already complete in all its parts. The earlier the example, the more massive the form. This completely disproves the theory, that the pillars were copies of stems of trees used as posts. It seems more likely that the first pillars were square piers of rubble or brick-work, with a flat stone or tile laid on the top, to form a good bed for the beams to rest on. These formed the architrave, stretching from pier to pier, on which rested the cross-beams supporting the rafters of the roof, the ends of the latter suggesting the dentils and modillions (mutules) of the cornice, the former, the triglyphs (see ENTABLATURE). The square form of the pier was afterwards modified by cutting off the corners, and again cutting off the remaining corners, until the polygon suggested the fluted shaft. The same process was afterwards gone through by the mediæval architects in developing the piers (q.v.) of Gothic architecture.

After the temple at Corinth, the next remaining example is the temple at Ægina (q.v.), built about a century later, or 550 B.C. There may have been many temples of the same date, but none now exist; they were probably destroyed during the Persian war, or removed to make way for finer buildings during the great building epoch of Greece which succeeded that war, and when she was at the summit of her power. Of this epoch, we have many remains. The temple of Theseus and the Parthenon at Athens (438 B.C.), that of Jupiter at Olympia (440 B.C.), Apollo Epicurius at Bassæ, Minerva at Sunium, and all the best examples of the Doric style of Greece, are of the age of Pericles. Besides the Peloponnesus, there are the countries colonized by the Greeks to which we can look for remains of Greek architecture. The Dorian colonists of Sicily and Magna Græcia carried with them the architecture of their native country, and furnish us with many fine examples. In Selinus there are six temples, the oldest being about the same age as that at Corinth. At Agrigentum there are three Doric temples, one of them founded by Theron (480 B.C.); this is the largest Grecian temple of the period, being 360 ft. long by 173 ft. broad. At Syracuse, Ægesta, and Pæstum there still remain many valuable examples.

As the Doric art progressed, the early massive forms gave place to more elegant and slender proportions. In the temple at Corinth the column is only 4.47 diameters in height; in the Parthenon, which is universally recognized as the finest example of the style, the column is 5.025 in height; and in later examples it becomes still taller and thinner, until it runs into the opposite extreme from which it started, and becomes so meager and attenuated as to lose entirely the boldness and vigor of design which are the chief characteristics of the style.

One thing to be particularly admired in the Doric style is the beauty of the sculpture with which it is adorned, and the appropriate manner in which the sculpture is placed in the building, and the building suited for the sculpture. It has been shown by Mr. Penrose that every line was the subject of the deepest study on the part of the architect, for the purpose of correcting and allowing for all optical aberrations. The result is, that there is hardly a single straight line in the building; all the lines, which appear to be perfectly straight, are drawn with accurate curves, so as to produce the smoothest and most pleasing effect to the eye. Every harsh angle is softened, and every disagreeable combination of lines avoided. For example, the columns have an Entasis (q.v.) or slight swelling formed by a hyperbolic curve; the architrave of the front is curved upwards, so as to correct the optical illusion caused by the sloping lines of the pediment, and the columns are sloped slightly inwards, so as to give greater appearance of solidity.

The Parthenon is built entirely of white marble, and the whole of the masonry in this, as in other Doric works of importance, is put together with the most perfect workmanship.

There seems to be no doubt that this and other Greek temples were adorned externally with color. To what extent this decoration was carried, is not clearly ascer-

tained; but it is probable that the exterior walls were covered with historical pictures, which were sheltered from the effects of the weather by the portico surrounding the temple. The sculpture was probably also relieved by a flat color on the background, and the moldings decorated with painted or gilded ornaments.

Ionic.—This style took its rise about 500 B.C., and as we have seen that the earlier Doric was imported from Egypt, so the Ionic seems to have originated from the influence of Assyrian art. The recent discoveries of Layard and others have shown that many of the characteristic ornaments of the style were in common use in Assyrian architecture. The volutes of the capitals are particularly indicative of an eastern origin, the scroll being an ornament of very common use in all eastern art.

The finest examples of the Ionic style remaining in Greece are the temples of the Wingless Victory (*nikè apteros*) and the erechtheum at Athens, built about 450—420 B.C. In the Ionian and other colonies of Asia Minor, also, many fine examples of this style were erected. The celebrated temple of Diana at Ephesus was of the Ionic order. It was the largest temple we know of up to its time, being 425 ft. long by 220 ft. wide. No trace of it now remains.

The Ionic is a graceful and elegant style, but not so pure and severe as the Doric. The latter is distinguished by simple and beautiful outline, enriched with the most perfect sculpture; the former trusts rather to ornamental carving for its effect. This love of elaborate ornament is an indication of the eastern influence under which the style originated, and the moldings and many of the ornaments are found to be identical with those of Assyrian architecture, only refined and simplified by the Greeks. The honeysuckle ornament, so commonly used both in Assyrian and Ionic architecture, is a good example of the improvement effected by the Greeks on the original type. In the Ionic as well as in the Doric, we find the most perfect execution and workmanship, the spirals, entasis, etc., being all drawn and cut with the greatest possible exactness.

Corinthian.—This style was the latest introduced, and combines, to some extent, the characteristics of both the preceding. It unites and blends together the Egyptian and Assyrian elements, the cap being probably derived from the bell-shaped capitals of the former country, ornamented with the carved leaves and spirals of the east. This order was first used about the time of Alexander the Great, the earliest example extant being the Choragic monument (q.v.) of Lysicrates (335 B.C.). There are also the temple of the winds and that of Jupiter Olympius at Athens, the latter being one of the largest and finest examples of the style.

The Corinthian is the most florid of the Greek styles, and although invented by the Greeks, it was not brought into use till after the power of the republics, to which we owe the finest works of Greek art, had begun to wane. This style, from its richness and splendor, became afterwards the greatest favorite with the Romans, in whose hands Greek art became spread over the whole empire.

Caryatides.—Besides the above styles, which constitute *the Greek orders* of classic writers, the Greeks also used *caryatides* (q.v.), or female figures, in place of columns, as in the erechtheum and *telamones* (q.v.), or giants, as at Agrigentum. These were probably derived from the figures used by the Egyptians in their architecture, but the latter never used them as columns; they always placed them as statues in front of the columns.

Greek temples are technically classed and designated by the mode in which the columns of the porticoes are arranged. The *cell*, or temple proper, is a square chamber contained within four walls; the simplest form of portico is called *distyle in antis*, the two side-walls being continued past the end-wall, and terminated with antæ, or pilasters, with two columns between.

When the portico has four columns between the antæ, it is called tetrastyle.

The temples have generally the same arrangement at both ends.

In front of both ends of the plan *distyle in antis*, there is frequently placed a range of six columns, and from the flank columns a row is continued along both sides. Such an arrangement is called *peripteral*, and the temple is designated hexastyle and peripteral. This was a common arrangement.

The Parthenon is an exception to the general rule: it has a hexastyle portico at each end of the cell, in front of which is placed an octostyle portico, and seventeen columns at each side.

The great temple at Agrigentum had seven columns at each end, and fourteen at each side, and was peculiar in having the space between the columns all round filled up with a wall. The reason probably was, that the space between the columns was too great to be spanned by architraves in single stones. The wall was pierced with windows.

Considerable doubt has existed as to the mode adopted by the Greeks for lighting the interior of their temples; that suggested by Mr. Fergusson seems the most probable, as being similar to the plan used by the Egyptians and Assyrians. The interior had generally a double row of columns, one over the other, dividing the width into three spans. This arrangement still exists in the temple of Neptune at Pæstum. Mr. Fergusson supposes that the light was introduced by counter-sinking a part of the roof, so as to admit the light between the pillars of the upper range, thus forming a kind of

clerestory. Windows, however, were also used, as in the temple at Agrigentum and in the erechtheum.

The theaters of the Greeks formed another very important class of works; they consisted of semi-circular rows of seats cut in the rock, or partly built. Remains of these structures are found in all the countries inhabited by the Greeks, and were frequently of great size—that at Dramyssus being 443 ft. across. The proscenia were the parts on which architectural design was chiefly displayed; but these have unfortunately all perished.

None of the palaces or domestic edifices of the Greeks remain to us; we are thus totally deprived of a very interesting chapter in the history of domestic architecture, for it is highly probable that the streets and houses of Greece, although not so splendid and enduring as the temples, were more varied in style, and exhibited many picturesque and beautiful forms, which are now entirely lost.

The attempt has been made in modern times to revive Greek architecture, and some ingenious modifications and adaptations of it have been carried out. But it was found that this style, so beautiful and appropriate in the warm and genial climate of Greece, was quite unsuited for our northern latitudes. The porticoes are useless in a climate where external painting cannot last, and where the sunshine is courted rather than excluded; the pitch of the roof is not high enough to throw off our snows; and windows of sufficient size for our dark skies are not admissible. Grecian architecture has therefore been abandoned; and its place is now taken by a style more appropriate to our climate, and more suited to the feelings of the people.

GRECIAN GAMES. See GAMES, ANCIENT.

GREECE. The name by which the ancient Greeks delighted to call their native country was Hellas (q.v.). The terms Græcia and Græci were first used by the Romans, being derived probably from a small tribe in Epirus, near Dodona, called *Graikoi*, with whom the Romans may be supposed to have been, from proximity, best acquainted.

Extent, etc.—This country, so celebrated in the history of freedom, of literature, of art, of philosophy, and of civilization generally, varied much in size at different periods of its history. Hellas at first was applied only to a small district in Thessaly; at a later period it denoted not only the Morea, and what is commonly called Greece Proper, but also Macedonia, Epirus, and the islands of the Ægean.

Boundaries—(1) *Ancient*.—The northern limit of ancient Greece may be fixed about the 40th parallel of n. lat.; the s. extremity being in 36° 23′. The barrier separating Greece from Illyricum and Macedonia on the n. was that range of mountains which, starting from the Adriatic as the Ceraunian range, merges into the Cambunian ridge in the center, and runs out into the sea on the e. as the far-famed Olympus. The Ægean sea washes the country on the e., the Mediterranean on the s., and the Ionian and Adriatic on the west. The greatest length is about 250 English miles, and the greatest breadth 180; the area (not including Epirus, but including Eubœa) is about 21,000 sq.m. —i.e., about two thirds the size of Scotland. The Cyclades are reckoned by themselves, and amount to rather more than 1000 sq. miles. See *islands* at end of article. (2) *Modern*. The extent of modern Greece is much more limited. Its n. boundary was fixed in 1834 by a line drawn (in lat. 39° 8′ n.) from the gulf of Arta (Ambracia) in the w. to the gulf of Volo (Pagasæ) in the e., thus excluding the greater part of Thessaly and much of Acarnania, with all Epirus. The greatest length of this territory is not more than 200 English miles, and its superficial area, including Eubœa, but not the Cyclades, about 15,000 sq.m., or half the size of Scotland.

Physical Conformation.—Greece is essentially a country of mountains, hills, and valleys. From the ridge which forms its northern frontier, there starts in a southerly direction the Pindus chain, the backbone of Greeee, dividing Thessaly from Epirus, and giving origin to those numerous streams which water the mainland. About lat. 39°, it sends off two spurs to the e.; Othrys (Gura), which terminates at the gulf of Volo—and a little further s., Œta (Katavothra), at the extremity of which is the famous pass of Thermopylæ. Some ridges of less note run westward. From this point the great central chain extends in a s.e. direction (though with many windings), as far as mount Cithæron, and even through Attica as far as cape Sunium, under the names of Parnassus, Helicon, Cithæron, and Hymettus; while in a s.w. course we find many ranges crossing the country towards the Ionian sea and the gulf of Corinth (Lepanto), in a direction parallel with, or slightly inclined to, that of the central chain. The somewhat lateral range of Cithæron and Parnes, on the borders of Attica, is extended through Megaris into the Morea or Peloponnesus by a lower ridge, which, passing across the isthmus of Corinth, stretches even to the w. coast. Of this range, the two most conspicuous points are mounts Cyllene and Erymanthus, from which two chains run s. on the e. and w. of Arcadia respectively, and under the names Taygetus (Pentedactylon) and Parnon (Malevó), terminate in the promontories of Tænarus and Malea. Besides these, there are many shorter chains and individual peaks, which it would be tedious and out of place to detail. It may be sufficient to state, that there is no country of Europe, except Switzerland and the w. parts of Scotland, which can be compared to Greece in the extent, variety, and irregularity of its mountain system, and the number and character of its valleys. Of all the divisions of Greece, Arcadia is most like Switzerland in its

rugged nature and generally elevated surface. Some of the mountain peaks of Greece rise to a great height; thus, Olympus is 9,700 English feet, and is covered with snow; Guiona, on the frontier, 8,240 ft.; Parnassus, 8,001; with many others of 7,000, 6,000, and 5,000. Helicon is 4,963; Cithæron, 4,630; Cyllene, 7,745; while the Acrocorinthus, or citadel of Corinth, is 1869 above the level of the sea. The mountains of Greece are more remarkable for the suddenness of their rise than for their great elevation. So, too, there are many smaller peaks and cones notable for the abruptness with which they spring from the plain, such as the Acrocorinthus, the rock of Ithome, and the Meteora cliffs of Thessaly near the Peneus. These last are huge masses of rock standing out from the plain to heights varying from 100 to 300 or 400 ft., with sides perpendicular as a wall. They assume the shapes of pillars, cones, and other figures more or less regular; they cover a space of nearly two sq.m., the recesses between the pinnacles being filled with trees and dense brushwood. The summits are occupied by monasteries, the only access to which is by baskets, nets, or ladders swung in the air.

Minerals.—Greece is not rich in minerals: gold, silver, copper, lead, and iron, are found, but the mines have never been worked with zeal. The most famous mines in ancient times were those of Laurium in Attica. Coal is found in Eubœa and in some parts of the Peloponnesus; salt is procured in many districts of Greece and in the Ionian islands; and marble of the purest kind, and of various colors, may be had in endless amount in almost all parts of Greece. The most famed quarries were in Paros, Carystus (in Eubœa), Pentelicus, and Hymettus. Marble and building-stone were quarried by the old Greeks to a very large extent. There are many mineral springs, both cold and warm, and many caverns still emit those mephitic exhalations which in bygone days quickened the imagination of the poet, and confirmed the superstition of the peasant.

Plains and Valleys.—The valleys of Greece are very numerous, but owing to the great number and irregular courses of the mountain ranges, are very small. The two great plains are those of Thessaly and Bœotia, the former being the largest and the most fertile in all Greece: that of Messenia is both extensive and fertile.

Coast-line.—As Europe is pre-eminent among continents for the great extent of its sea-coast, so is Greece for a similar feature remarkable among the kingdoms of Europe. The bays are very numerous, and many of them run far up into the land, so that no part of the country is far from the sea—a circumstance which gives the inhabitants great facilities for commerce, and which leads the modern Greeks, as it did the ancients, to occupy themselves in very large numbers with maritime affairs.

Water-system—(1) *Rivers.*—The rivers of Greece necessarily follow its valleys in character. None of them are navigable. The most important stream is the Achelous (Aspropotamo), which rises in Mt. Pindus, flows in a s. direction through Epirus, and empties itself into the Ionian sea, at the mouth of the gulf of Corinth, after a course of about 130 miles. The Spercheus rises in the Pindus range, and disembogues into the Malic gulf, after traversing for more than 60 m. the fertile vale which is bounded on the n. by Mt. Othrys, and on the s. by Mt. Œta. Besides these, there are in n. Greece the Cephissus, rising in Doris, near the base of Mt. Parnassus, and flowing through the fertile Bœotian plain into lake Copais (Lago di Topoglia, or lake of Livadia); and in the s. part of Bœotia, the Asopus (Vuriemi). In Peloponnesus, the principal streams are the Eurotas (Vasilipotamo) and the Alpheus (Roufia). By the banks of this latter, the great Olympic games were celebrated. The rivers of Greece depend for their supplies mainly on the atmosphere; hence in summer the larger streams are greatly reduced in size, and the majority of the smaller ones are either almost or altogether dry channels. Many of them are nothing more than mountain torrents, or gulleys, which the heavy rains of autumn and winter fill for a short season.

(2) *Lakes.*—The many hill-encircled valleys of Greece, from which there is no outlet, afford the most favorable opportunity for the formation of lakes; hence the rains of autumn and winter stagnate in many cases in the valleys of the mountains, and for at least a part of the year, form tiny lakes or tarns. Some of these are permanent, though with great difference in depth of water, according to the season of the year, while others degenerate in summer into reed-grown marshes and pestilential fens. See Bœotia.

Climate.—The climate of Greece varies very considerably in different parts of the country. In the highlands of the interior, the cold in winter is often very severe, snow lying for several months. On the plains, and in the lower districts near the coast, snow is seldom seen; but the n. and n.w. winds are frequently very trying, though there is no intense cold. The summer heat is often excessive; and the sirocco not unfrequently visits the s. and lower parts. In moisture, too, there is much difference; thus, while Attica is remarkable for its pure air and beautifully bright sky, Bœotia has been famed from ancient times for the moisture of its climate and the fogginess of its atmosphere. The swampy valleys of lake Copais and other marshy tracts, when acted on by the scorching heat of a summer's sun, produce those noxious vapors which are found in so many parts of Greece, breeding malaria and disease. This defect seems to have increased since classical times, either from the greater thinness of the population, and the consequent diminution of tillage, or other causes not easily reached. But drainage would be an easy matter in a country whose rock-formation is of so soft a character as

that of Greece. Were its natural advantages aided by drainage and irrigation, Greece might yet become one of the healthiest and one of the most fertile countries of Europe.

Productions.—The more common products of Greek soil in ancient times were wheat, barley, and other cereals; flax, wine, and oil, with fruits of various kinds. The figs of Attica were and still are famed for the excellence of their flavor. Forests once covered many of the hills, and supplied timber for domestic purposes and for ship-building: they are still extensive in some parts. The most important productions of modern Greece are those mentioned above, with maize, rice, millet, currants, and silk. Honey is produced in great quantity on Hymettus and in some parts of the Peloponnesus The mulberry-tree is largely grown for the silk worm; and on the n. and s. shores of the gulf of Corinth, as well as in Arcadia, and the w. coast of the Peloponnesus, the Corinthian grape or currant is most extensively cultivated. Vines flourish in almost all parts, but the island of Santorin possesses the most famous vineyards, with the greatest variety of grapes, and furnishes a wine highly prized by the Russians. The olive grows in a wild state over all parts of Greece; when ingrafted, it yields an excellent fruit, which the inhabitants pickle in very large quantity, as a staple article of food. The oil of the olive serves to supply light, and is used in cooking and for food, as we employ butter. Cotton, madder, tobacco, and leguminous plants grow in considerable quantity. Fruit-trees are specially fertile; figs and apricots are plentiful and of excellent quality; oranges, citrons, lemons, pomegranates, almonds, water-melons, gourds, and others of less note are widely spread, largely produced, and of excellent quality.

Flora and Fauna.—The flora of Greece resembles that of other countries of s. Europe. Among the tame animals of ancient Greece were the horse, mule, ass, ox, sheep, goat, swine, dog. The swine supplied the favorite flesh meat. Of wild animals, we find the wolf, bear, boar, and even lions at an early period. Sheep and goats are still very plentiful, and in fact constitute one of the most important sources of wealth to the Greeks. Oxen are much used for plowing, but milch cows are little prized, and scarce. At the present day, the wolf, bear, lynx, wild-cat, boar, stag, roebuck, fox, jackal, badger, marten, and many other wild animals are found in the forests. Hares, snipes, wild-ducks, and other game are very abundant; while eagles, vultures hawks, owls, etc., are found in considerable numbers. The tortoise is very common, but the inhabitants have a great aversion to it.

Agriculture.—The agricultural implements are still as rude as in the days of the Peloponnesian war, or even of Hesiod; and this added to the scarcity of plowing oxen, ruggedness of the country, general thinness of soil, and difficulty of tillage and irrigation, is enough to damp the ardor of even a more energetic population. The houses of the country-people are in most parts little better than mere hovels, and a large proportion of the arable land is untilled. The modes of tillage are of the most primitive kind; and thus, though nearly half the male population of Greece is employed in agricultural labors, they make but slight impression on the general aspect of the country, and influence little the amount of exports; in fact, they do not produce as much grain as supplies the wants of the population, and that, too, though a higher yield is given in many parts of Greece than in this country. Much labor, however, is bestowed on the cultivation of the olive, vine, mulberry, and fruit trees. The greater part of the land belongs to the state; rent is paid in kind, and in a certain proportion (one-third) to the net produce. The proprietor is in very many cases obliged to furnish the *metayer*, or tenant, with seed to sow the ground, and with oxen to plough and prepare it; and as the *metayer* has an interest in the farm for only one year, there is little encouragement for either landlord or tenant to expend largely in improvements—such as drainage, fences, clearing of the soil, and comfortable farm-steadings. The country, however, is better suited for a pastoral than an agricultural people. Arcadia is still the land of shepherds, as it was of old. The flocks are driven to the valleys near the coast in winter, and in April to the hills.

Manufactures.—The manufactures are few and unimportant. Cotton and woolen stuffs, and some minor articles are made by the peasantry for domestic use. Ship-building is carried on at most of the sea-ports; and silks, gauze-stuffs, cutlery, hardware, earthenware, leather, saddlery, and such articles are made in small quantities in some of the principal towns, and more especially on the islands. The Greeks have great skill in embroidering in silk, gold, and silver; also in sculpture, and in the cutting of marble. Carpets are made in the island of Andro, and straw-hats at Lifanto. The modern Greeks are not behind their great ancestors in the art of dyeing in bright colors.

Commerce.—Every circumstance tends to make the Greek a man of commerce. He is of a quick, active, versatile, practical turn of mind, and possesses all those qualities which insure success in business. The bays and gulfs of the sea-indented shore allure him to the waters, while the strong currents and frequent squalls on his iron-bound coast soon render him an expert and fearless seaman. The islanders are thrown into a seafaring life even more than the people of the mainland. Greece occupies a position in the Mediterranean, which, for commercial advantages, cannot be surpassed. The exports of ancient times were of course mainly the products of the soil, the trees, and the mines; and the same do they remain at the present day. Raw produce, as cotton, corn, currants, figs, and other fruit, tobacco, olive-oil, honey, wax, gum, valonia bark, silk, and sponge are the most common. From western Europe manufactured goods of all kinds and the

produce of our colonies are largely imported; while Turkey, from her provinces in Europe and in Asia, supplies coffee, rice, timber, drugs, and other articles of eastern growth. The Greek merchants speculate largely in the grain trade. The principal sea-ports are Syra, Piræus, Patras, and Nauplia, and the ports with which they trade most are Constantinople, Leghorn, Trieste, Palermo, and Smyrna. The mercantile navy of Greece is very large, amounting to upwards of 6,000 vessels, many of 500 or 600 tons, but the majority are small craft, for short voyages from island to island, or to ports near Greece. It is as agents and carriers that the Greek ship-owners are specially engaged. They are, in fact, the great commission-agents and carriers of the Mediterranean. Greek merchants have now established themselves in London, Liverpool, Manchester, Glasgow, and other towns of the British empire, as well as in those of France and of Germany; and as they have greater facilities for collecting articles of commerce from the inland parts of their own and contiguous countries, besides, as they despise no sort of commission or merchandise, however small or insignificant, they now usurp almost the entire traffic of the Ottoman empire, of Persia, and of other eastern countries.

Internal Commerce.—But one great drawback to the development of Grecian resources, and the increase of a home-commerce, is the miserable state of the internal communication. Without a navigable river, with not a single canal, and with less than 100 m. of road fit for a donkey-cart in the whole extent of its territory, it is little wonder that the inland inhabitants are devoid of energy and enterprise, and that they consume but little of the imports from abroad. Mules, asses, horses, and men carry on their backs over rugged paths, and through mountain-passes, the scanty supplies of foreign luxuries and necessaries for the Greek peasant of the interior. Even from Athens to Corinth there is no carriage-road!

Political Divisions.—In ancient times Greece was divided into a great number of petty states, each consisting of at least a city and some portion of surrounding territory. There was no king ruling over the whole country, no federal union which embraced all the states, no common council or government. Amphictyonic leagues did exist at one period, and in later times the Achæan and Ætolian leagues were formed with patriotic and national objects in view, but these applied only to a limited area, and were of only local operation; hence quarrels were of constant occurrence, and Greece wasted on internal struggles those energies and means, which, if properly husbanded, united, and directed, might have raised her to the very pinnacle of fame and of prosperity in every department of human industry and human exertion. It was only when some monster danger threatened universal destruction that all united for the common good, as in the Persian invasions, and even then jealousies and selfish interests caused many to join with those who sought to ruin the fatherland. The divisions of ancient Greece, as laid down on maps, afford a very imperfect idea of the political condition of the country, singly or relatively; but as they have been so long known to the world under certain names, it will be best to mention them as usually given. Starting at the s.e., we have the triangularly shaped Attica, separated from Bœotia on the n. by the range of Cithæron and Parnes, Bœotia, Phocis, Doris, Locris, Ætolia, Acarnania, Epirus, Thessaly, and Eubœa; and in the Peloponnese, Argolis, Laconia, Messenia, Elis, Achaia, and Arcadia, with Megaris, partly on the isthmus of Corinth. By the existing arrangements, modern Greece is divided into 13 provinces or nomarchies, which are again subdivided into 59 eparchies, and these again into demarchies or cantons. Of the nomarchies there are in Hellas, or northern Greece, Attica and Bœotia, Phocis and Phthiotis, Acarnania and Ætolia: in the Peloponnesus, Argolis and Corinthia, Achaia and Elis, Arcadia, Messenia, Laconia: in the islands, Eubœa, the Cyclades, Corfu, Zante, Cephalonia. See ATTICA, BŒOTIA, EUBŒA, etc.; and for Cyclades, see section "Islands" at the end of this article.

Government.—In ancient Greece each state managed its own affairs, and governments were of different kinds. In Homeric times, monarchy seems to have prevailed to a considerable extent, but in later years republics, aristocracies, and oligarchies almost entirely usurped the ruling power; factions were rife, and in many cases their contests led to a total disruption of the body-politic. The present constitution of Greece was arranged by an assembly elected in Dec., 1863, and adopted Oct. 29, 1864. The whole legislative power is vested in the Boulé, or house of representatives, the members of which are elected by manhood suffrage for four years. The elections take place by ballot, and the chamber must meet annually for not less than three, nor more than six months. There must be an attendance of at least one-half of the members to give legality to the proceedings, and no bill can become law without the consent of an absolute majority of members. The assembly has no power to alter the constitution itself. The chamber of deputies meets, on ordinary occasions, on Nov. 1 (O.S.) of every year. The number of members varies with the population, but in 1875 it was 188. The executive is vested in the king and the ministers at the head of the following departments, who are responsible for the acts of his majesty: ministry of the interior, finance, justice, education and ecclesiastical affairs, war, marine, and foreign affairs. There is also a deliberative council of state, whose members are named by the crown, and hold office for two years. There must not be less than 15, nor more than 25. To this council must be sent all bills from the chamber of deputies, and returned with observations or amendments within 10 days; but this term may be prolonged for 15 days more. If no report is then made,

the deputies may pass the law and send it up to the king. The education of the people is undertaken at the public cost; offices of state and positions of distinction are open to all. (See articles on individual cites and states.)

Administration of Justice.—The supreme court of justice is called, as in Athens of old, the Areopagus. Besides this, there are 4 courts of appeal, 16 courts of primary jurisdiction, the court of assizes, and 175 justice-of-peace courts, with all the orthodox accompaniments of lawyers, juries, notaries, etc. There is a complete code of laws to meet all the cases which may arise between man and man. Capital punishment is exigible for certain offenses, the guillotine being the instrument of execution. The most numerous class of felons are brigands and assassins. The Greek judges enjoy a well-earned reputation for independence and strict uprightness.

Army and Navy.—Under a law promulgated in 1876, the military forces of Greece are divided into four parts—the regular army, the regular reserve, the militia, and the militia reserve. All Greeks between 19 and 30 years of age, not serving in the regular army, are placed in the regular reserve; those from 31 to 40, in the militia; and those from 41 to 50, in the militia reserve. The whole strength of the army under the bill is estimated at 200,000, 120,000 of whom belong to the regular army and its reserve, 50,000 to the militia, and 30,000 to the militia reserve. The number of the regular army is usually about 15,000. At the commencement of 1875 the navy consisted of 1 ironclad, 6 screw steamers, 4 schooners, 2 cutters, and the royal yacht. It is useless as a defense from foreign powers, and serves only to repress piracy, and that in an ineffective way. The naval station is Poros, at the entrance of the gulf of Ægina.

Money, Weights, and Measures.—The unit of the monetary system is the drachma (q.v.) = 8½*d.* English; the unit of weight is the oke = about 2 lbs. 11 oz. avoirdupois; the common measure of length is the pique = 27 inches. A stremma of land is about ¼d of an English acre.

Finance.—The financial affairs of Greece seem to be in a state of hopeless bankruptcy. The kingdom started on borrowed capital, the three great powers of England, France, and Russia having guaranteed a loan of 60 millions of francs (£240,000), partly to indemnify Turkey and other creditors of Greece, and partly to assist agriculture and manufactures in their early struggles. The expenses of the court and government, the carelessness of officials, and the non-receipt of the taxes, have added to the embarrassment of the exchequer, so that at the present time the Greek treasury owes upwards of 483,000,000 dr. (£17,497,000) nearly a third of which is due to the three powers, and the remainder to capitalists, principally in England.

Inhabitants (Ancient Greece).—Of the earliest inhabitants of ancient Greece we have no definite knowledge. The term *autochthones* (sprung from the soil itself—earth-born), which the Greeks applied to themselves, means no more than this, that the people had been there from time immemorial, and that future generations had not the means or the inclination to trace their origin any further back. At a very early period the population of Greece was largely, if not entirely, composed of Pelasgians (q.v.). It is most probable that the Hellenes were only a branch of this great Pelasgian stock, but possessing more energy of character, they gradually spread themselves over the greater part of Greece, and supplanted the language and institutions of the Pelasgi by their own. Thus they became the ruling race, and gave their name to the country.—*Modern Greece.*—The population of modern Greece is of a very mixed kind. In Ætolia, Acarnania, Thessaly, the greater part of Peloponnesus, and most of the islands, the descendants of the old Greeks are still predominant; but a very large admixture of Albanians (see ALBANIA) prevails in Attica, Bœotia, Phocis, and Argolis, with the islands of Spezzia, Salamis, Hydra, and Andro. The true Greek is easily recognized by his tall stature, slim body, aquiline nose, oval face, and mustache. Whiskers are not considered staid and respectable; the beard is worn only in mourning. The Greeks are uncommonly temperate both in eating and drinking, and in the indulgence of the passions generally; flesh is seldom eaten; the diet is principally vegetable. The Greeks are devotedly attached to their fatherland, and their love of liberty and independence is not less strong than it was in the days of Miltiades and Themistocles. Aristocracy is, in consequence, at a discount; and though they love and are loyal to a good ruler, yet they are easily roused into resistance by the infringment of their rights. Commercial bargains are the delight of the Greeks, and they often manage, it is said, to part with their wares at twice their value. This deceit they practice against the Turks especially. The Greek women are very plain. Early marriages are common in Greece. Greek matrons take great pride, like Niobe of old, in a numerous and beautiful offspring. But many of the children are cut off in infancy by the fevers which prevail so commonly. Two peculiar branches of the Greek race are—the Mainotes (from a district called *Maina*) of the Peloponnesus, and the Palikars of the north highlands. The former, who boast to be the descendants of the ancient Spartans, inhabit principally the mountain fastnesses of Taygetus, where for centuries they defied the power of the Turks. They resemble in their sturdy independence, feudal relations, robbing propensities, and other characteristics, the Highlanders of Scotland 150 years ago; but in recent times, education, intermixture with other races, and commerce, have to a great extent removed their distinctive peculiarities. The Palikars, that is, *Braves*, originally belonged to the northern parts of Greece, but when Thessaly and other portions were by treaty left in the hands of the

Turks, these hardy mountaineers chose to leave their ancient homes and settle in the new kingdom, to establish which they had shed their blood. The red cap, the white shirt, and the golden jacket, mark them out even to the casual observer as a separate class. They go about armed, and attended by armed followers; their houses are fortresses, and their servants form a little army. The islanders are almost all seamen or traders; they wear the red cap, a short jacket, and wide Turkish trousers. The Albanians form about a fourth of the population; they are a strong, hardy race, and engage in agricultural or other severe labor. They are the hewers of wood and drawers of water to the more wealthy classes. They speak a language which is little allied to either Slavonic or Greek. The Wallachs are a nomad and pastoral race; they sleep on the hillsides with their flocks, which are guarded by ferocious dogs. There are large numbers of Maltese at Athens, and the Piræus especially. There are few settlers from western Europe. The Bavarians who swarmed into Greece on the accession of king Otho have almost all disappeared.

Religion.—See the articles GREEK RELIGION (ancient), and GREEK CHURCH.

Education (ancient).—The education of the ancient Greeks was more of a physical than of a mental kind. The *gymnasium* was that of the athlete, not that of the *didaskalos* or preceptor. Young children were, till about their sixth year, trained at home under females, but were then sent to the *didaskaleia*, or schools under the charge of private tutors or pædagogi. The duty of the pædagogus was rather to keep his wards from outward injury and bad companions, than to teach them the accomplishments of grammar (including reading, writing, and arithmetic), music, and gymastics, the favorite subjects of study in those days. In later times, the more intelligent slaves were specially trained for the duties of the pædagogus.—*Modern.*—Education of all kinds, from the humblest school to the university, is free to all. Hence, an unusual number of Greeks press into the learned professions, and a large educational machinery is necessary to supply the demand for knowledge. There are about 370 communal or elementary schools, and 180 Hellenic schools, in which, among other branches, ancient Greek is taught. Besides these, there are eight gymnasia, four medical schools, one theological, one military, one agricultural school, one school of arts; and finally, there is the university of Athens, which possesses the four faculties of theology, philosophy, law, and medicine. All these institutions are well attended, and the youth of all ages are most zealous in prosecuting their studies.

Language (ancient).—The Greek language is a branch of that widespread family of tongues, usually called Indo-Germanic or Aryan. It prevailed not only in the different parts of Greece, but also in the numerous Greek colonies which fringed the shores of the Euxine and the Mediterranean. But it must not be supposed that it was of the same type at all periods of Greek history, or in all parts of Greece, even at the same time. The three great branches of the Greek tongue were: 1. The Æolic, the oldest form, and that which presents the greatest affinity to the Latin and other members of the Indo-Germanic stock. 2. The Doric, a highland dialect, delighting in broad and rough sounds; it was spoken in the mountains of Thessaly, whence it traveled southward, and on the migration of the Dorians, took possession of the Peloponnesus. 3. The Ionic, a soft and vocal language, delighting in vowel sounds, and avoiding the harsh combination of consonants; it was spoken principally by the people of Attica and the Ionian colonies in Asia Minor. From it was made, by a series of contractions and modifications, that most perfect form of the Greek language, the *Attic*, which was neither so harsh and broad as the Doric, nor so soft and vocal as the Ionic. It was brought to the height of perfection by the poets, the philosophers, and the historians of Greece, whose writings still teach the world, and command its admiration. By the conquests of Alexander the Great, the Greek language soon spread over a large part of the then known world, but corruption at once set in—words of other languages were adopted into the Greek, foreign idioms were introduced, and the rigid syntax of the great Athenian writers was neglected, so that, in process of time, there arose a depraved form of speech, called the Hellenistic, varying in many essential points from its great parent. In this last form, the books of the New Testament were written. The process of deterioration still went on till about the middle of the last century; when at length the spirit of the Greek nation again arose, and amidst other endeavors to revive the ancient glory of their race, an attempt was made, and is still being made, and that too with great success, to restore the purity of the language. This leads us to the *Language of Modern Greece.*—In different parts of Greece, different languages are spoken according to the element which predominates in the population. Thus Turkish prevails in some districts, Albanian in others, Wallachian in others, and Bulgarian in others; but in the greater part of Greece proper, the language is *Romaic Greek*, or as it is now more usually and more properly called, Neo-Hellenic. This language bears a very close resemblance to the Hellenic, or classical Greek; and in fact does not differ more, if so much, from the Attic, as the Attic differed from the Doric. Information on this subject must be sought in a grammar of the language. Great efforts have been made in recent years to purge the Neo-Hellenic of barbarisms and foreign terms, and it is now written with such purity, that good scholars in ancient Greek will have little difficulty in understanding Tricoupi's history or an Athenian newspaper.

Literature (ancient).—The literature of Greece is a subject so extensive, that we can-

not hope to give any adequate view of it in our limited space. Those who wish to study the matter further, must have recourse to a full treatise. Poetry seems to have been the earliest form of composition among the Greeks, as indeed it must of necessity be in all nations, for facility of recollection; hence *Memory* is called the *Mother of the Muses*. The earliest species of poems seems to have been hymns in honor of the gods; to these succeeded songs praising the glorious deeds of heroes; but the greatest poem of ancient times which has come down to us is the *Iliad* of Homer, detailing the events connected with the siege of Troy, and the warriors who took part in that famous expedition. The *Iliad* and *Odyssey* have been too long and too generally known and admired to need a word said in their commendation. The remarkable popularity of the Homeric poems produced a host of imitators; and hence we find that a great many poets endeavored to rival the fame of the "blind old man," by narrating in verse the after-fate and vicissitudes of the heroes who took part in the war of Troy, or by treating of subjects allied to that of the *Iliad*, and even of mythological fables. These were called the Cyclic poets; they were posterior to Homer and Hesiod; their writings were put together in chronological order by some Alexandrine grammarians about 200 B.C. The Homeric period is closed by the name of Hesiod. Homer is supposed to have flourished about 900 B.C., and Hesiod about 850 B.C. Hesiod's most celebrated writings are the *Theogony*, the *Shield of Hercules*, and the *Works and Days*, an agricultural poem. Of his others, only small fragments are preserved. Epic poetry culminated in Homer, and with him and his contemporaries it sets. Of lyric poetry, there were two schools—the Æolic in Asia Minor and adjacent islands, especially Lesbos, and the Doric in Peloponnesus and Sicily. Of the Æolic school, the earliest poet was Callinus (700 B.C.); after him came Archilochus, so famed for his cutting satires, written in iambic verse; Tyrtæus, and Simonides of Amorgos, who contests with Archilochus the honor of having invented iambic verse. Alcæus and Sappho (about 610 B.C.) represent the Æolic school in its perfection. Nor must we forget the school-boy's favorite, Anacreon (about 520 B.C.), to whom, however, are attributed many pieces which are not considered genuine. Of the Doric or choral school, it may suffice to mention Alcman, Stesichorus, Arion, Simonides, Bacchylides, and greatest of all in every known variety of choral poetry, Pindar (q.v.) the Theban (522 B.C.).

Greek literature reached its highest perfection in the tragedies of Æschylus (b. 525, d. 456 B.C.); Sophocles (b. 495, d. 405 B.C.); and Euripides (b. 480, d. 406 B.C.). The writers who endeavored to follow in the track of these three great masters were of far inferior merit, and with them tragedy degenerated to the effeminacy of lyrical songs and mere rhetorical bombast.

Comedy, like tragedy, took its origin from the worship of Bacchus. The three great names of the old Attic comedy are Cratinus, Eupolis, and Aristophanes (b. 452, d. 380 B.C.). In middle comedy, we have the names of Antiphanes and Alexis; and in new comedy Philemon and Menander.

History did not engage the attention of the Greeks till a comparatively late period. Passing over the names of Cadmus of Miletus, Pherecydes of Scyros, Hecatæus, and Charon of Lampsacus, we come to Herodotus, the father of history, or, as he has been called, the Homer of history, who flourished about 440; Thucydides, about 430; and Xenophon, about 400. In later times, we find Polybius (204–122 B.C.); Dionysius, of Halicarnassus, who flourished about 20 B.C.; Diodorus Siculus, a contemporary of Julius and Augustus Cæsar; Plutarch; Appian (in time of Hadrian and Antoninus Pius); Arrian (time of Hadrian); and Dion Cassius. In geography, we have Strabo and Pausanius. In satire, the palm is carried off by Lucian (q.v.). In oratory it may be sufficient to mention the names of Antiphon, (b. 480 B.C.), Andocides (467 B.C.), Lysias (458 B.C.), Isocrates (436 B.C), Æschines, the great rival of Demosthenes (389 B.C.), Hyperides; and last and greatest of all, Demosthenes (385 B.C.). On the philosophers, see PHILOSOPHY.

Literature (modern).—The literature of modern Greece is still in its infancy. No work of importance appeared previous to the revolution; but since the establishment of the kingdom in 1829, more life has been infused into the men of a literary bent. The names of the brothers Panagiotis and Alexander Soutsos are well known to many in England. They have written dramas, love-songs, novels, lyrics, and a poem (by Alexander) in the style of Byron's *Childe Harold*, detailing the wanderings, sights, and adventures of a Greek in France and Italy. In most of these there is much merit, though few readers can fully appreciate the style and handling. Among dramatic writers, Neroulos, Rangavis, and Charmouzis hold a foremost place. The *Memoirs of Different Battles fought between the Greeks and Turks from* 1820 *to* 1829, by Perrævos, is a well-written book. In grammar and lexicography, Banvas, Gennadios, Scarlatto Byzantino, and others have done good service to the cause of learning. But of all the Neo-Hellenic works yet published, the *History of the Greek Revolution* by Tricoupis is the most valuable—valuable not only for its statement and facts, but also for the purity and elegance of its style. Many newspapers and other periodicals, in Neo-Hellenic, are published at Athens, Constantinople, London, and elsewhere; but the expense of these literary efforts is in most cases borne by wealthy Greek merchants now so frequently met with in the west of Europe. It will require many years of good government, of national industry

and prosperity, before Greece can expect to assume that position in the world of letters which the prestige of her name entitles her to anticipate.

History (*ancient*).—The early history of Greece is lost in the mist of ages. The legends of gods and heroes, which constitute her only approach to history, are of that marvelous kind in which a superstitious and ignorant age delights. But how much truth may underlie the stories of Cecrops, Cadmus, Danaus, Theseus, Heracles, and many others, it is difficult to say; or to what extent the events of the Argonautic expedition, Trojan war, hunt of the Calydonian boar, and other joint-stock exploits may be real, historians can never hope to discover. The heroic age is roughly estimated as continuing from 1400 to 1200 B.C.; but all Greek chronology is mere guess until the first Olympiad, 776 B.C. Of the migrations which took place during these early days, and of the numerous colonies planted by the Greeks, it is unnecessay to speak in this brief sketch; nor can we do more than merely refer to the wars of the Spartans against the Messenians, which, beginning in 743 B.C., did not ultimately terminate until Ithome was destroyed in the third Messenian war, 455 B.C. Meantime, wars of less magnitude are carried on in different parts of Greece; Solon legislates at Athens (594 B.C.); Pisistratus and his sons enjoy the "tyrannis" at Athens from 560 B.C. to 510 B.C.; Crœsus, king of Lydia, and Cyrus the great, his conqueror, are brought into contact with the Asiatic Greeks (560–542 B.C.). And now, in 499 B.C., the burning of Sardis by the Athenians and Ionians leads to those three invasions of Greece by the Persians which end so gloriously for Greece, and so disastrously for Persia, and with the particulars of which all are so well acquainted. The first, under Mardonius, in 492 B.C., is averted by the shipwreck of the invading fleet off Mount Athos; the second, under Datis and Artaphernes, in 490 B.C., is hurled back from Marathon; and the third, under Xerxes, 480 B.C., is utterly shattered at Thermopylæ, Salamis, and Platæa. Greece is now a mighty name, but the Athenians become the ruling state, and their supremacy continues till 404 B.C. Meantime, disunion at home succeeds the contests with foreign enemies. The great Peloponnesian war begins in 431 B.C., and wastes the energies of Greece for 27 years, until the subjugation and partial demolition of Athens, in 404 B.C., put an end for a time to the fratricidal struggle. It was in 415 B.C., the 17th of this war, that the famous and unfortunate expedition to Sicily took place. Under Pericles, who was the ruling spirit of Athens at the commencement of the war, but who died of the great plague in 429 B.C., the Athenians reached the highest pitch of excellence in sculpture and architecture; then were raised some of those wondrous buildings whose remains still excite the admiration of posterity at a distance of more than 2,000 years. In 401 B.C. the expedition of Cyrus the younger to dethrone his brother Artaxerxes, took place; the battle of Cunaxa, in which Cyrus was slain, was fought in the same year. Cyrus had employed Greek mercenaries, and this brief war is specially famed for the masterly retreat of the 10,000 Greeks under Xenophon the Athenian in 401–400 B.C. The next year (399 B.C.), Socrates the philosopher, the teacher of Plato and Xenophon, was put to death. After the defeat of the Athenians in the Peloponnesian war, the Spartan state became the leading power in Greece, and was engaged in four wars in sucession—1. the Elean (399–398 B.C.); 2. the Corinthian (395–387 B.C.); 3. the Olynthian (380–379 B.C.); 4. the Theban (378–362 B.C.). The great Spartan hero of these troublous times was Agesilaus, whose panegyric has been written by Xenophon with a friendly pen. During these eventful years were fought the battles of Coronea and of Corinth (394 B.C.), Orchomenus (375 B.C.), Leuctra (371 B.C.), Mantinea, in which the Theban hero, Epaminondas, was slain, 362 B.C. In 359 B.C. Philip ascends the throne of Macedonia, and a few years afterwards finds occasion to intermeddle in the affairs of Greece. Some of the allies of Athens renounce his supremacy, and thus arises the social war (357–355 B.C.), in which Athens loses many of her tributaries, and much of her revenue. The sacred war (355–346 B.C.) immediately follows, in which Philip takes part. About this time (352 B.C.), Demosthenes delivered the first of those powerful orations against Philip, called Philippics. In the battle of Chæronei a (338 B.C.), the Athenians and Thebans are utterly defeated by Philip; and at the congress of Corinth, in the following year, he is appointed generalissimo of the Greek forces against Persia. But the hand of the assassin cut him off at a marriage-feast in Macedonia; and after an unsuccessful revolt against his son Alexander, the Greeks are compelled to bestow upon the youthful hero the same high military office with which they had intrusted his father. The events of Alexander's career are well known. From this time Greece becomes an appanage of the Macedonian kingdom, until Macedon is in turn overcome by the Romans. During the wars which arose among the successors of Alexander, Greece was always the bone of contention; she suffered in consequence many hardships and enjoyed but few lulls of peace. The last struggle for Grecian liberty was made by the Achæan League (a confederacy of cities at one time embracing all Peloponnesus, which had a common object, a common council, and a common chief or *strategus*), but it too fell before the conquering arms of Rome, and after the capture of Corinth in 146 B.C. by the consul Mummius, the once mighty Greece became a province of the Roman empire.

History (*modern*).—The history of Greece for some centuries after the capture of Corinth belongs to the history of her conqueror. The Roman wars with Antiochus,

Mithridates, and others, involved Greece in countless hardships; and the fierce struggles of Cæsar and Pompey, of Brutus and Cassius with Antony and Octavianus, of Antony and Octavianus, of which Greece was often the theater, entailed upon her many calamities. For nearly two centuries after the accession of Augustus, Greece enjoyed comparative tranquillity, during which Christianity spread among her people, churches were founded, and many devoted Greeks went abroad to strange lands and periled their lives in the propagation of the gospel. But dark days again awaited her, and successive inroads of Slavonians, Albanians, and other barbarous hordes, overran the country from the wintry plains of the north. When Constantine divided his empire, Greece was attached to the eastern portion; but when, in 1204 A.D., the Venetian fleet under Dandolo overpowered the rickety throne of the Cæsars, Greece too changed masters. The Osman Turks, who migrated to Europe in 1355 A.D., and made themselves masters of Thrace, Macedonia, Thessaly, and other parts, captured Constantinople in 1453 A.D.; and from that time until recent years, Greece was subject to Mohammedan dominion. All the annoyances that ignorance, brutality, tyranny, and greed could suggest, were practiced by the Turks on the much enduring Greeks, but at length human nature could no longer endure, and in 1820 broke out that rebellion against Turkish rule, which, by the bravery and determination of the Greeks, and the friendly countenance of Christian Europe, ended in the establishment of Greece as an independent kingdom in 1829. Two unsuccessful attempts at rebellion had been made in 1770 and 1790. Capo d'Istrias, the first president of liberated Greece, was assassinated in 1831; and after several candidates for the throne of the infant kingdom had been proposed and rejected, Otho, second son of the king of Bavaria, was at length (1832) chosen by the three powers (Britain, France, Russia) which had assisted Greece in her noble struggle. The reign of Otho was not a peaceful one, and he had very serious difficulties to contend with after he had assumed the reins of government in 1835. But his rule has not been altogether devoid of fruit; and law and order, industry and commerce, literature and notions of self-government, have advanced. On the banishment of Otho in 1862, the crown was offered to prince Alfred of England. The agreement between the protecting powers, however, stood in the way of his election, and the present king, Georgias I., son of Christian IX. of Denmark, became king of the Hellenes in 1863. The Berlin congress of 1878 recommended the addition to Greece of the southern portions of Thessaly and Albania; but difficulties occurred to postpone this desirable restoration.

Population.—The population of ancient Greece at any one time it is quite impossible to conjecture. Of modern Greece, the inhabitants numbered, in 1871, 1,457,894.

The Islands.—The islands of the Ægean sea may be comprehended, as in ancient times, under two groups—the Cyclades and the Sporades. The former were so called from the legend of their *circling* round Delos, when that island was rendered stationary for the birth of Diana and Apollo. The latter receive their name from the circumstance of their being *scattered* or *sown* in an irregular manner round the coasts of the adjoining countries, and mostly belong to Turkey. The following list contains the islands belonging to Greece; the first 20 are the Cyclades; the others, part of the northern Sporades, lie off Eubœa. The Italian names are in parentheses. The Ionian islands, formerly a republican dependency of Great Britain, were annexed to Greece in 1864.

1. Delos with Rhenea (Dili); 2. Syros (Syra); 3. Myconos (Mycono); 4. Tenos (Tino); 5. Naxos (Naxia); 6. Andros (Andro); 7. Ceos (Zea); 8. Cythnos (Thermia); 9. Seriphos (Serpho); 10. Siphnos (Siphanto); 11. Cimolos (Argentiera); 12. Melos (Milo); 13. Pholegandros (Policandro); 14. Sicinos (Sicino); 15. Ios (Nio); 16. Thera (Santorin); 17. Anaphe (Nanfio); 18. Amorgos (Amorgo); 19. Paros (Paro); 20. Oliaros or Antiparos (Antiparo); 21. Scyros (Scyro); 22. Sciathos (Sciatho); 23. Scopelos (Scopelo); 24. Icos (Chiliodromia). Besides these, there are many smaller islands and barren rocks, which belong to Greece, but which from their unimportance scarce deserve mention. These islands possess many of the features which mark the mainland: the climate is varied; the soil is in one fruitful, in another barren; the productions are much the same as in Greece, except that in some of them, as Santorin, the vine grows in greater variety and luxuriance; the population is more primitive, and less mixed, and consequently retain more pertinaciously the customs of their forefathers. The islanders are generally more industrious and more happy than the continentals—the sea is their highway, and they can more easily get a market for the fruits of their industry. The islanders are excellent seamen, and a very large proportion of the males are employed in navigation. Delos is now little more than a barren rock; and scarce a vestige remains of the temple of the Sun-god, or other memorial of its former religious and commercial pre-eminence.

Syra (population 21,000) is the principal port of Greece, and a great center of trade. The Mediterranean steamers call at it. Wine is almost the only production of the island.

The people of Tenos are famed for the manufacture of marble tables, chimney-pieces, etc., which are largely exported, and the finest Malvasian or Malmsey wine is produced in the island. Of the other islands, the most volcanic is Thera; it produces in large quantity the wine called *Vino Santo*, or Santorin, of which the Russians are specially fond. Naxos is the largest and most beautiful and most fertile of the Cyclades. These islands comprise an area of rather more than 1000 sq.m., and a population in '71

of 123,299 souls. The Cyclades are generally high and rocky in their coasts, and all are of a very similar aspect in this and other regards.

GREEK CHURCH, THE, taken in its widest sense, comprehends all those Christians following the Greek or Greco-Slavonic rite, who receive the first seven general councils, but reject the authority of the Roman pontiff, and the later councils of the western church. The Greek church calls itself "the Holy Orthodox Catholic and Apostolic church," and it includes three distinct branches—the church within the Ottoman empire, subject directly to the patriarch of Constantinople; the church in the kingdom of Greece; and the Russo-Greek church in the dominions of the czar. The last shall form the subject of a separate article, but it must also be alluded to in treating of the sister-churches. The proper history of the Greek church as a separate body dates from the commencement of the Greek schism, or rather from the commencement of the efforts on the part of the church of Constantinople to establish for itself a distinct jurisdiction, and an independent headship in the eastern division of the empire. The ecclesiastical pre-eminence of Constantinople, it need hardly be said, followed upon the political distinction to which it rose as the seat of the imperial residence, and the center of the imperial government. Originally, Byzantium was but a simple episcopal see, subject to the metropolitan of Heraclea; but the rank of the see rose with the fortunes of the city; and before the close of the 4th c., a canon of the first council of Constantinople, held in 381, assures to it, on the ground that "Constantinople is the new Rome," the "precedence of honor" next after the ancient Rome. This privilege, however, was purely honorary, and did not imply any pre-eminence of jurisdiction in the see of Constantinople, and there are many early instances in which questions arising within the district which afterwards became the patriarchate of Constantinople, nay, questions affecting the bishop himself, and even in his relations to the other patriarchs, were referred to the bishops of Rome. But the transition was not difficult, and was aided by the eminent qualities of some of the bishops, and especially of St. John Chrysostom, so that in the council of Chalcedon (451), a decree was passed, which confirmed the precedence already given, and not only assigned to Constantinople an extensive range of jurisdiction, but also grounded these ecclesiastical privileges, in the case of the new as well as in that of the old Rome, upon the political precedence to which both successively had risen. The Roman legates protested against this canon, and the claim led to a misunderstanding between the two churches, which was widened and confirmed by the doctrinal differences which prevailed on the Eutychian question, in which the patriarchs of Constantinople gave their support to the *Henoticon*, a heterodox or equivocal formula put forth by the emperor Zeno, which was warmly resisted in the west. The pope, in consequence, in 484, excommunicated the emperor, together with the patriarchs of Constantinople and Alexandria; and thus the east and west were, *de facto*, separated for a period of nearly 40 years. The terms upon which the excommunication was withdrawn by pope Hormisdas in 519, involved a complete and explicit acknowledgment of the supremacy of the Roman pontiff; but the rivalry of Constantinople still subsisted. In the end of the 6th c., the Trullan council (see TRULLAN COUNCIL) caused a renewal of the misunderstandings. Many circumstances combined to hasten a rupture: the title of "Ecumenical patriarch" claimed by the patriarch John the faster, and reprobated by Gregory the great (see GREGORY I.); the contests about image-worship, in which the patriarchs, in more than once instance, took the part of the iconoclast emperors; the abandonment by the emperors of the defense of Italy against the Lombards; the gradual growth of an independent confederation of Italian states, and ultimately the foundation of a new empire of the west, the political antagonism of which with the eastern empire almost necessarily involved an antagonism of the churches themselves. Hence when, upon occasion of his own personal contest with the see of Rome, the deposed patriarch Photius (862) (see PHOTIUS), identified his cause with that of the eastern church, he found a ready sympathy among his countrymen. The Latin doctrine of the twofold procession of the Holy Ghost, and the addition of "Filioque" to the Latin creed, the Latin practice of clerical celibacy, and of denying to priests the power of administering confirmation, supplied the grounds of quarrel; and although the Photian schism fell with its author, and the communion of the churches was restored, their reconciliation was imperfect and far from cordial. The same causes of controversy, with others of a disciplinary nature, were renewed in the 11th c.; and in 1054 the pope Leo IX. issued a formal sentence of excommunication against the patriarch Michael Cerularius, which was solemnly published in Constantinople by the papal legates. Beyond the points of difference alleged by Photius, the most important of the new grounds of division was the use of unleavened bread by the Latins in the eucharist. Since that time, the separation has been perseveringly maintained. More than one attempt was made by the authorities upon either side to restore the former relations of the two churches, but in vain. The old antipathies of east and west became more inveterate by the separation; and the occupation of Constantinople by the Latins (1201), the outrages and atrocities by which it was disgraced, the establishment of the Latin kingdom at Constantinople, and the arbitrary tyranny by which it was maintained, widened still more the ancient estrangement. Nor was the breach healed by the re-establishment of the Greek empire (1261). The emperors, from political motives, pressed on all sides by the fears of foreign invasion and the embarrassments

of domestic discontent, proposed, as the price of the assistance of the west in their necessity, the restoration of the eastern church to the obedience of Rome. Michael Paleologus (see MICHAEL PALEOLOGUS) by his ambassadors abjured the schism at the council of Lyons in 1274; and endeavored, by a synod held subsequently at Constantinople, to obtain a ratification of the union; but he failed to gain the assent of the body of bishops; and in the succeeding pontificate, the breach was even more seriously renewed, by two synods held at Constantinople in 1283 and 1285. The necessities of John Paleologus compelled him once again to resort to the same expedient; and the negotiations for union were on this occasion conducted with much more deliberation. Delegates of the Greek church, with the patriarch of Constantinople at their head, attended at the great western council (1437) of Ferrara (better known, from the place of its close, as that of Florence), and a protracted discussion took place, the chief points of which were the procession of the Holy Ghost from the Father and Son, the addition of "Filioque" to the creed, the nature of the purgation of souls after death, the use of unleavened bread in the eucharist, and the supremacy, by divine right, of the Roman pontiff. On all these points, the Greek delegates, with the exception of Mark, bishop of Ephesus, subscribed the decree of the council; but this union was equally short-lived. On the return of the delegates to Constantinople, their proceedings were repudiated by the large body of the Greeks; and the downfall of the Greek empire and capture of Constantinople by the Turks in 1453, obliterated every trace of the attempted reconciliation. Since that time, some isolated bodies of Christians of the Greek rite have joined the church of Rome (see end of this article); but every attempt at a general union on the part of the Roman pontiffs has proved a failure. It has been the same with the attempts which have been made by the Protestant communions to establish an understanding with the Greek church. Very early after the reformation, a letter was addressed by Melancthon to the patriarch Joseph of Constantinople through a deacon, Demetrius Mysus, who visited Germany in the year 1558. Another Lutheran embassy of a more formal character, headed by the well-known Tübingen divines, Andreæ and Crusius, visited Constantinople during the patriarchate of Jeremias (1576–81). But both missions were equally without result. In the following century, the celebrated Cyril Lucaris (see LUCARIS), who had been educated in the west, and had carried home with him a strong, though for a time carefully concealed bias towards Protestantism, opened the way for negotiations with the Calvanistic party. Soon after his elevation to the patriarchate, he issued a decidedly Calvanistical confession of faith (1629). But far from carrying his fellow-churchmen with him in the movement, the innovations which he attempted not only led to his own deposition and disgrace, but called forth a doctrinal declaration signed by the patriarchs of Constantinople, Alexandria, and Antioch, and many metropolitans and bishops, which, by the clearness and decision of its definitions, draws the line so markedly between the Greeks and reformers as to shut out all possibility of accommodation in matters of doctrine. This exposition was adopted by all the churches; and in a synod held in Jerusalem 1672, it was adopted as the creed of the Greek church. This declaration having been originally drawn up by Magilas, metropolitan of Kiew, it was published in 1722, by order of Peter the great, as an authorized formulary of the Russian church, under the title of *The Russian Catechism*. With a few exceptions, to be specified hereafter, it coincides with the formularies of the Roman Catholic church.

The Greek church comprised within its ancient limits, anterior to the Moliammedan conquest, Greece properly so called, the Peloponnesus, Eastern Illyricum, the islands, and Asia Minor, as also Syria and Palestine, Arabia, Egypt, and parts of Mesopotamia and Persia. But with the first triumph of the Koran, the church of Constantinople by degrees lost almost all her territory in Asia and Africa; and since the conquest of the Turks, it has sunk into the condition of a weak and oppressed dependent. By the separation of the Russian branch, partially in the 17th, and finally in the beginning of the 18th c., and by that of the new kingdom of Greece, on occasion of the revolution, its importance has been still more diminished. Each of the three divisions into which it has separated possesses a distinct organization; but as the faith and practice of all are substantially identical, we shall first give a brief account of the doctrines of the Greek church, especially in their relations to the Christian communions of the west, and to the controversies by which they are separated from each other.

In general, it may be inferred from the fact that the Greek church receives the first seven councils, that on all the controversies regarding the trinity and incarnation the Greeks are agreed with the Western Catholics, with the sole exception of the double procession of the Holy Ghost, in which they are at issue not only with Catholics, but it may be said with the entire body of western Trinitarians. While they reject the papal claim to supremacy and doctrinal authority, they agree with Catholics in accepting as the rule of faith not alone the Bible, including the Deuterocanonical books (see Synod of Jerusalem in Harduin's *Coll. Concil.*, xi. col. 258), but also the traditions of the church, that is, what are believed to be the unwritten revelations of our Lord and of the apostles, preserved by the testimony of the fathers, among whom they regard with special veneration Basil, Gregory of Nazianzum, and Chrysostom. They admit the seven sacraments as received by the Roman church—viz., baptism, confirmation, eucharist, penance, extreme unction, holy orders, and matrimony; but in the rites used by them in the administration of these sacraments there are considerable discrepancies from the Latin

rite. They administer baptism by a triple immersion; confirmation is administered in immediate connection with baptism, even in the case of infants, and it is administered by priests, and not, as among the Latins, by bishops exclusively. As to the eucharist, the Greeks admit the real presence of Christ, the transubstantiation of the elements, the propitiatory sacrifice, and (although this has been denied by Protestants) the adoration of the host (see Renaudot, *Liturg. Collectio*, i. pp. 22, 23). But they differ from Catholics in the use of leavened bread, in administering the communion in both kinds, and in administering it in this form even to children. In the sacrament of penance, they recognize, like the western Catholics, auricular confession, priestly absolution, and penitential works; and although they differ from the Latins as to the use of indulgences, they admit the principle upon which their use is founded, and even their applicability to the dead. The peculiarities of their use of extreme unction have been already detailed. See EXTREME UNCTION. In the sacrament of holy orders, they have many peculiar observances. See ORDERS, HOLY. The most striking point of difference regards clerical celibacy. The Greek church recognizes the excellence of virginity, and the fitness of its observance by those engaged in the ministry, so far as to prohibit marriage altogether to bishops (who are always chosen, in consequence, from the monastic, and not the secular clergy); to forbid priests or deacons to contract marriage after ordination; to forbid to all, without exception, a second marriage, or marriage with a widow; and to require of married priests that they shall live separate from their wives during the time when they are actually engaged in church services. But they not only permit married candidates to be advanced to deaconship and priesthood, but even require, as a general rule, that they shall be actually married before they can be admitted to orders. While admitting marriage to be a sacrament, they hold it to be dissoluble in case of adultery, and they regard fourth marriages as utterly unlawful. On the condition of souls after death, they do not admit with western Catholics a purgatorial fire, but they admit the principle of the intermediate state of purgation, and of the practice of prayer for the dead. They also admit the intercession of saints, and the lawfulness of invoking them, especially the Holy Virgin Mary, and of honoring their shrines and relics. They do not permit the use of graven images, with the exception of that of the cross; but they freely receive and pray before pictures, which they hold in high honor, and on which they lavish the most costly ornaments of gold, jewels, and other precious things. In their belief of the merit of good works, and especially of fasting, they go even further than Roman Catholics. Besides four yearly fasts—the forty days of Lent, from Pentecost to the feast of saints Peter and Paul, the fifteen days before Assumption day, and the six weeks before Christmas—they observe the Wednesdays and Fridays throughout the year as fasts. Their liturgy shall be described hereafter (see LITURGY); for the present, it will be enough to say that, in splendor of ceremonial, they are not inferior to the westerns. Instrumental music, it is true, is forbidden in the churches, but singing is universally in use. In public prayer the kneeling posture is used only at pentecost; at ordinary times they stand, the body being turned towards the east. The use of the sign of the cross is habitual among them. The monastic institute has subsisted in the Greek church from the earliest times, and numerous convents of both sexes are dispersed over the east, which follow almost exclusively the rule of St. Basil. The abbot is called Hegumenos, the abbess, Hegumené; if several convents be subject to a single abbot, he is called Archimandrite. Both monks and nuns are bound by vows of celibacy. With both, the duty of manual labor is a leading observance; the nuns, like their western sisters, apply themselves to the care of the sick, and to the education of young females.

As regards the separate constitution of the three great sections of the Greek church, it will be enough to say that the church in the Turkish empire has remained subject to the patriarch of Constantinople, who from the beginning enjoyed a continued but precarious protection from the sultan, and even held as regarded his own flock, a civil pre-eminence, with the rank of a "pasha of three tails." But in return for this civil status, the Porte claimed the right of appointing and also of deposing the patriarch, a right which was habitually exercised as a matter of purchase and sale, and which led to the grossest simony, not only as to the patriarchate, but in the entire ecclesiastical system. Formerly, the metropolitan of Russia (afterwards patriarch) was subject to the patriarch of Constantinople, as also the bishops of the modern kingdom of Greece; but both churches are now independent of Constantinople. The patriarch of Constantinople, Jeremias II., in in the year 1589, consented to the creation of a separate but dependent patriarch: and this dependence continued until the time of Peter the great, by whom the partriarchate was first suspended and afterwards abolished, the Russian church being now governed by what is called the holy synod, an ecclesiastical commission appointed by the czar. The independence of the church of the kingdom of Greece dates from the revolution. The "organic law of Epidaurus," of Jan., 1822, proclaimed the oriental Orthodox church as the church of the state, and soon afterwards measures were taken to organize this church in the new kingdom. For a time, the patriarch of Constantinople hoped to preserve his ancient authority; but the president of the new state, Capo d'Istrias, firmly resisted, and, after many preliminaries, the new church was formally organized by a decree of July 15 (27), 1833, on a plan in great part borrowed from the constitution of the Russian church, as settled by Peter the great.

The governing body in the church of the kingdom of Greece is, as in the Russian, the so-called "Holy Synod," which consists of five members, who are ordinarily archbishops, or bishops, but may also admit into their number one or two priests or monks. This synod is the supreme ecclesiastical tribunal, and in name at least is independent in spirituals; but as its members are all named by the crown, and hold office but for a year, it is practically a state instrument; moreover, two officials of the crown have a right to assist, although without a vote, at all its deliberations. The synod elects bishops, but the crown has the right of confirming and granting investiture. To it also belongs the power of regulating the limits of dioceses, and all such general arrangements. The last remnant of subjection to Constantinople was removed by a formal recognition of independence in 1868, and the bishops no longer seek consecration from the patriarch of that see. In 1869 a correspondence took place between the archbishop of Canterbury and the patriarch, with a view to the union of the Anglican and eastern churches. In the same year the government of Russia abolished the hereditary character of the Russo-Greek priesthood. The Russo-Greek church is believed to number about 55,000,000. The church of Greece comprehends a district of about 880 sq.m., and numbers about 800,000 members.

THE UNITED GREEK CHURCH comprehends those Christians who, while they follow the Greek rite, observe the general discipline of the Greek church, and make use of the Greek liturgy, are yet united with the church of Rome, admitting the double procession of the spirit and the supremacy of the Roman pontiff, and accepting all the doctrinal decisions subsequent to the Greek schism which have force as articles of faith in the Roman church. The united Greeks are found chiefly in southern Italy, in the Austrian dominion, in Poland, and in the Russian empire. In Italy, they are computed at 80,000; in Austria, at about 4,000,000; and in Poland, about 250,000. In Russia, it is difficult to ascertain their number. It has fallen off considerably in late years. In Austria, they are divided into Romanians and Ruthenians—the former being settled in Wallachia, Transylvania, and eastern Hungary; the latter, in Little Russia, Galicia, and north-eastern Hungary. The union of the Greek Christians of Wallachia and Transylvania dates from the end of the 12th c.; and although the reformation made some progress among them, they still for the most part remain true to the union. The union of the Galician Greeks or Ruthenians is of much later date, about the close of the 17th century. It is only necessary to add that the usage of the united Greek church as to the law of celibacy is, with the consent of the Roman pontiffs, the same as among the other Greeks. They are also permitted to administer communion under both kinds.

GREEK-FIRE, a composition supposed to have been of niter, sulphur, and naphtha as a principal ingredient, with which the Greeks of the Byzantine empire were wont to defend themselves aginst their Saracen adversaries. The accounts of its effects are so mingled with obvious fable, that it is difficult to arrive at any just conclusion as to its power; but the mixture appears to have been highly inflammable, and to have possessed the power of burning under water. It was projected either on blazing tow, tied to arrows, or through a tube, the precursor of cannon. Wherever the combustible fell, it made great havoc, from the inextinguishable nature of the fire. The invention of this material has usually been ascribed to Callinicus of Heliopolis, and the year 668 A.D; but there seems to be reason to believe that it was rather imported from India. At Constantinople, the process of making Greek-fire was kept a profound secret for several centuries. The knowledge, however, of its composition gradually spread; and at the time of the discovery of gunpowder, Greek-fire formed a recognized defensive element in most wars from western Europe to Asia Minor. Subsisting for some time concurrently with gunpowder, it gradually died out before the advances of that still more effective competitor, till now little vestige remains of Greek-fire beyond a Norman corruption of its name in our fire-work "cracker," which derived from "Creyke" of the middle ages, is but a corruption of "Grecque." See also FIRE-ARMS.

GREEK MUSIC. The existence of music as an art or science among the ancient Greeks has for hundreds of years been a subject of inquiry and discussion among the learned. With the restoration of the art and sciences at the end of the middle ages, the veneration for all that belonged to that people was carried to such an extent, that because we had to thank them for much, many writers thought we must be obliged to them for all. Fortunately, we have handed down to us various dissertations and fragments on music by old writers, which, although they do not unfold to us anything like a satisfactory view of the ancient Greek music, yet suffice to show us that among the ancient Greeks the art of music was in a very imperfect and incomplete state, and that, in its elements and groundwork, it was entirely a slave to poetry, and can have been little else than a kind of intoned declamation. We hear from ancient writers of the magic influence of music; but we must not forget that they used the word music in a collective sense for the gift of the muses generally; and when they spoke of the elevating and moral effects of music, it is to be understood that they meant a general harmonious cultivation of the arts and sciences. The system of music known to the ancient Greeks, and as practiced in their temples and theaters, differed essentially from our modern music, as their scale, or succession of sounds, was not based on the octave and its repetition, but on a fourth and its repetition. Their scale consisted of five tetrachords,

each containing four consecutive sounds; the last sound of one tetrachord being always the first of the next; while two of their tetrachords had more than one sound in common. In modern music, the ancient Greek scale would be as follows: B, C, D, E; E, F, G, A; A, B♭, C, D, etc. This they called the diatonic genus. They had also their chromatic genus, thus, B, C, D♯, E; E, F, G♯, A, etc.; and their enharmonic genus, the tetrachords of which consisted of two quarter-tones (which cannot be expressed in modern music) and a major third. It is beyond a doubt that the ancient Greeks neither possessed a system of notation by which their music, such as it was, might have been preserved, nor had they any idea of harmony in the modern sense of the word. Many believe it impossible that a people who have left us specimens of their poetry and sculpture, which, after 2,000 years, are still admired as master-works, could have been content with such an imperfect and clumsy system of music. Had it been otherwise, it is scarcely possible to imagine that the knowledge of it would not have been handed down to us. An ode by Pindar, and a hymn or two set in modern notation from an old Greek MS., is the whole we possess of ancient Greek music, and those are said by many to be spurious.

GREEK PHILOSOPHY. See PHILOSOPHY.

GREEK RELIGION (ANCIENT), the most poetical and most humane of polytheisms, presents itself in historical times as a plastic worship of nature, with its visible objects and its invisible powers; of abstract notions, sensations, propensities, and actions; of tutelary Numina, household or family gods; and of exalted men or heroes. Composed of such widely discordant elements, this great Hellenic pantheon offers yet a unity so harmonious and consistent in its minutest parts, that its origin is even more difficult to trace than that of the people itself, which, from a conglomeration of heterogeneous races and tribes was fused in an incredibly short space of time into one great family of equal propensities and of equal gifts. This question of the origin of the Greek religion has indeed been a point at issue from the time of Herodotus to our own. While he, together with many others, pronounced it to be almost completely an importation from Egypt, a strong autochthonic school held it to be homesprung; and these two antagonistic views—the east and Hellas—have, in a more or less modified form, found their foremost representatives in modern days, in Creuzer on the one side, and Otfried Müller on the other. The new and all-important science of comparative mythology, however, may be said to have set this point at rest; for it proves almost to demonstration, that the fundamental ideas of the Greek religion are due to the regions n.w. of India, the cradle of the main Hellenic stock (see ARYAN RACE); while subsequent colonists introduced gods from Peenicia, Egypt, and other parts of the east. All these, with the host of personified fancies and ideals begotten by the poets at home, were soon amalgamated into one great system. Yet those foreign elements, so far from detracting from the originality of the Greeks, show in a still stronger light what brilliancy of conception and power of imagination, what harmony and plasticity, had fallen to the share of the inhabitants of Hellas; a land which in itself, by the immense variety of glorious scenery of sea and sky, wood and mountain, river and bay, rock and island, contributed not a little to quicken that immortal youthfulness by which they were so aptly and strikingly called throughout the east the people of Yavan (Sanscr. *Yuvan* = *Juvenis* = *Young*). The gods, from the moment they touched these shores, from dead symbols became living realities, with all the qualities and sensations, aims and actions, of a living individuality, and that of the highest, most noble, and divine frame existing—man. Anthropomorphism, indeed, is the chief characteristic of Greek religion. The brute creation—which to the east was something to be exalted, and to be adopted as the type of divinity—furnished the Greeks only with a few attributes for their humanly-shaped gods. But man, the ideal of creation, was deficient in one thing: the duration of his life was limited—and in this the gods differed from him: they were immortal. In all other respects, they were like himself: they loved and hated, they "transgressed" and suffered. No ideal moral code existed with the Greeks, the first essentially ethical people though they are; consequently, their gods, when they could not attain the objects of their many and strong desires in a straightforward manner, had unscrupulous recourse to stratagem and cunning, and through their questionable practices, not unfrequently brought themselves into very undignified positions. And yet the influence of such unworthy conceptions of the gods was not so detrimental to the believer as at first sight might be supposed; for the Greek deities were not to be patterns for humanity; they were, through their mighty origin, their almost unbounded powers, and their immortality, exempt from the ordinary laws which must rule the dealings in the commonwealth of low, weak, dying humanity. They were a kind of exalted aristocracy, who could not be judged by a human standard, much less be imitated by human beings; and, after all, even they had to submit to a supreme fate (*Moira*) which found out their guilt, and punished it. The mortal, however, was subject to them individually; and it was his special province to fulfill the duties of piety and modesty towards them, of righteousness and justice towards his equals. On this condition alone, the undisturbed enjoyment of life with all its most glorious gifts was his. Retribution for evil doings followed, with rare exceptions, speedily and irrevocably, on the earth he trod, not at some future period or in other realms. There was a hereafter,

but it was a shadowy thing without life and blood, a miserable nether world of cheerless twilight. Only for very extraordinary crimes was there something like a real, fearful, and everlasting punishment in store in the hades, or the still more terrible tartarus; while, on the other hand, only the most exalted heroes are, after their death, endowed with a new body and enjoy the pleasures of elysium. But these are very exceptional cases: "When a man is dead," says the shade of Anticlea, "the flesh and the bones are left to be consumed by the flames, but the soul passes away like a dream."

We cannot attempt here to enter minutely into this vast subject of Greek theology—to trace its historical development from the days when the early Pelasgians invoked, like their Persian and German kinsman, the highest god without image or temple, and the minor deities as the "Great Ones," the "Unknown Ones," the "Merciful Ones," without distinct name and shape—to the time when every sound and every sight, every thought and every deed, had a sublime significance, caused and inspired as it was by a god; when the prodigious number of clearly defined, and individually and most sumptuously worshiped gods formed one of the mightiest impulses to the development of the arts; and from that period down to the days when the poets put prophecies of the speedy death of the gods into the mouths of their heroes; when philosophers openly declared "these things to be fancies and dreams," and religious persecutions hastened the downfall of a creed which had become adulterated by foreign elements no longer to be amalgamated—until Christianity stepped in, and not satisfied with deposing the gods of Greece, sent them, branded with the names of "evil powers," or "demons," in the sense of eastern "Satans," to perdition. Much less can we attempt here a minute enumeration and description of all the deities, their genesis and history, with the myths and legends, traditional or invented in historical times by poets and philosophers, or dwell on the immense influence of Greek religion on other religions, the Christian among them. It is only desirable here to trace a faint outline of the divine commonwealth, and the outward forms of the religious worship of the Greeks, in the so-called classical period. Some account of the principal deities will be found in special articles.

Without entering into the principal division of the gods into heavenly, terrestrial, and maritime, we will briefly mention the supreme council of the 12 national gods, who, together with a vast male and female retinue, dwelt on the heights of Mt. Olympus, around its highest peak. This, reaching into the sky, (Ouranos), was inhabited by Zeus, the son of Chronos, the highest, mightiest, and wisest being, king and father of gods and men: who watches over all human doings, principally over hospitality and the sacredness of oaths. Second in power is his brother Poseidon, the shaker of the earth, the ruler of the sea and all the waters of the earth. Next stands Apollo, the son of Zeus and Selo (darkness); he is (as Phoibos) the sun, and darts his rays or arrows as god of the chase, as god of destruction, as well as of beneficence. But he is not god only of the physical, but also of the mental light; hence to him belongs the insight into future events. He is the god of oracles, but, as such, equivocal (*loxias*); further, god of poetical inspiration, song, and music—leader of the muses. He is one of the sublimest figures among the gods. In his love and in his hatred, he is always enshrouded in a sacred dignity and majesty, of which even the most ribald fiction stood in awe. The god of the terrestrial fire, which in his person has been thrown from heaven to earth, is Hephæstus. His workshops are volcanoes, where metals are forged and wrought by him into artful forms; and as volcanic soil best matures wine, to him was assigned the office of cupbearer of the gods. Ares presides over war. Battles, slaughter, rapine, and the doom of cities are his delight. Hermes—originally, perhaps, the symbol of animal generation—appears as patron of the herds. He is the guardian of the roads and the messenger of the gods; he is, moreover, the inventer of the lyre and gymnastics. He is the presiding genius of commerce, and, as such, a knave, even a thief. With Zeus is coupled Hera, his sister and wife—beautiful, majestic, but exacting and quarrelsome. The foremost daughter of Zeus, and who sprang from his head in full armor, is Athene, who stands in a twofold relation to the light, physical as well as mental—whence she becomes the goddess of understanding and wisdom—and to the water (*Tritogeneia*); hence also her rivalry with Poseidon. The two elements, the warm and the moist, giving rise to the fertility of the earth, she is the goddess of the grain and of the crops; she is likewise goddess of war, and presides over female handiwork. Artemis, the twin-sister of Apollo, shares with him the chase and the light; her attributes are a torch and the moon. The Phenician goddess Astarte had risen from the foamy waves on the Greek shores as Aphrodite, the Greek goddess of beauty, of love, of voluptuousness. Her counterpart was the chaste maiden-goddess Hestia, in whom was personified the hearth as the center of the house and family. From the everlasting fire on her altar, the colonists took the flame which was to accompany them to their new settlements. The list of the Olympians closes with Demeter or Gaia. She is the goddess of agriculture, and, consequently, of settled institutions and laws.

An indefinite number of other gods followed, some of them little inferior in power and dignity to the 12, and who sometimes, like Dionysus, the god of goat-herds and wine growers, and others, acted as the special deities of certain classes. We may mention here Hades, Helios, Hecate, Leto, Dione, Persephone, Themis, Eos; the Charities, the Muses, the Moeræ, Proteus, the Nymphs, and other *daimons*—partly primeval local

deities, partly deified powers of nature; river, mountain, and forest gods; or personified abstract notions—such as Tyche, Psyche, Hebe, Thanatos, Phobos, Hypnos, Kratos, Bia, and the like conscious or unconscious allegories. Besides these, there is a mob of deities, or rather monsters, begotten by gods—the Harpies, the Gorgons, Pegasus, Chimæra, Cerberus, Scylla and Charybdis, the Centaurs, the Sphinx, etc.

A palpable link between gods and men is found in the heroes or demigods—i.e., men deified after death—a race sprung from the embraces of gods and the beautiful daughters of man. They became either, like Heracles (the Phenician Melkarth), founders of races, who were thus considered the sons of gods, or patrons of special trades and professions, like Dædalus, the *heros* of artificers and others. The entire absence of that dark and terrible, essentially eastern, notion of an evil principle, co-existent with the good, between which two rival powers the world is divided; the undaunted geniality of the Greek nature; the tendency towards humanizing the whole universe and its gods, who, again, had not disdained to ally themselves with mankind; and above all, the emancipation from an all-ruling hierarchy such as swayed the east, made the Greek religion dogmatically, as well as practically, one of the brightest and most joyous, no less than the mildest and most tolerant, of ancient creeds. The outward as well as the inward worship of the gods was with them purely a personal affair. No mediator stood between the individual and the deity; every freeborn man, woman, and child had the undisputed right to pray and to sacrifice when and where the heart prompted. The only office of the priests consisted in the care of certain sacred property, in providing for the service of the temple, in the performance of certain traditional rites, the recitation of certain ancient formulas handed down in the priestly families, and the expounding of the divine will expressed by oracles. The sacrifices (q.v.), which in earlier days had consisted in the votive offering of a lock, a garland, a tablet, or such simple fruits as were yielded by the soil, gradually, as hills and groves no longer sufficed, and temples, stately and sumptuous, adorned with gorgeous statues, had been erected, grew into splendid feasts, of which the gods were invited to partake, together with those who sacrificed. Of the periodical festivals held in honor of special deities, the games and sports, the scenic representations and musical contests connected with them, and of their peculiar influence in raising the literature, arts, and philosophy of the Greeks above that of all mankind, we have spoken under FESTIVALS, and we may further refer for particulars to such articles as DIONYSIA, PANATHENEIA, THESMOPHORIA, ELEUSINIAN MYSTERIES (where also the subject of the Mysteries is touched upon), as also to the headings OLYMPIAN, PYTHIAN, NEMEAN, and other GAMES.

One of the most characteristic provinces of the Greek cult was that belonging to the mantics or diviners. The Greek, looking upon the gods as his omnipresent friends, who were anxious to caution him against threatening dangers, or, in other words, firmly convinced by his own strong sympathy with nature, that a derangement of his own affairs, however unknown to himself, must produce a corresponding derangement in nature, could not but give some credence to the foreboding significance of natural or "supernatural" prodigies or signs. The ether or space between heaven and earth, would be the principal scene of these revelations; the storms that swept through it, the thunder that rolled around it, and the birds that floated in the blue abyss, were all so many divine omens. No less would the gods speak in the offerings immediately addressed to them—in the innermost entrails of the sacrificial animal—in the flame that rose from their altar—in dreams of the night, and strange sounds and portents by day; thus, in the midst of the assembled people, an ominous animal appeared, they speedily dispersed. Yet the free and clear Greek mind could hardly be suspected to have more than tolerated such practices, much less could it be supposed that it ever sank to the low level of groveling imbecility, as was the case in this matter of augury with the Etruscans (q.v.); and Homer—though to the astonishment of Xenophon—puts into the mouth of Hector the momentous words: "One omen only is significant—to fight for one's country!"

The growth of culture did indeed early free the Greeks from the vague awe of every-day phenomena, and the science of manticism fell accordingly into the hands of the lowest jugglers and soothsayers, believed in only by the herd. But in the same degree, there rose into highest importance another and exalted kind of prophecy—the oracles (q.v.). In this, the god Jupiter—afterwards principally Apollo, his son, the partaker in his counsels—spoke himself; first, in the rustling of leaves, in the clangor of brass basins, later, in distinct human words. He chose the weakest vessels—women, girls, to whom the divine gift was a burden and a pain. The Sibyl herself does not understand what the god says through her mouth; she is unconscious—in a state of somnambulism—of mania. But here the priests step in; they act as interpreters, as prophets, as *evangelides* (the progeny of some *evangelos*), "bringers of good tidings." Their influence, socially and politically, increased with that of the oracles themselves, especially when these latter, by degrees, from being casual and unforeseen, became frequent and regular. The richest gifts poured in from all parts, as it grew matter of piety to have recourse to them as means of grace. They thus rose into an institution, the importance of which, principally for the unity and consequent rise of Greece as a political power, cannot well be overrated. Besides the oldest oracle—that of Jupiter at Dodona—we may mention, out of the 260 which were counted throughout Greece,

those of Didyma, Delos, Abæ, Klaros, Larissa, Tegyra, of Trophonius—in a subterranean cavern—and of Amphiareus, near Oropus, in Attica, where the answers were revealed in dreams. But by far the most famous, and of highest import for the whole nation as such, was that of Delphi (q.v.), where the Amphictyonic council was held; where everything connected with the public worship throughout the country was settled; where the calendar itself was regulated; where, in fact, for a very long time was the real central power of Greece.—Its voice ceased under Julian the apostate.

GREEK WINES. The mountain ranges of Greece offer many declivities; sloping towards the south, most favorable to viticulture; but its vineyards have for centuries been much neglected, and the production of wine in Greece, which was considerable at the time of the Venetian supremacy, has sunk to a relatively insignificant amount. The production of currants, however, is still a highly important branch of Greek agriculture. The principal vines cultivated in Greece are the *vitis corinthiaca* or *apyrena*, the *Greco*, the *cipro*, the white and black *moscada*, the *malvasia*, the *sultana*, and the *assyrticon*. The vinification is very imperfect, and many wines contain so much acetic acid that they only last through the winter, and in summer turn into vinegar. To avoid this result the proprietors resort to smoking with wood smoke, or vapor of resins, which greatly injures their wine for foreign use. All provinces produce wine, but the best is that of Santorin, which is shipped largely to Russia. There is still a Malvoisie wine, though it is no longer that which was once so celebrated under the name of Malmsey; and the *Kephissia* wine of Attica and the red wine of Zante are in good repute. There has been a large increase in the number of vineyards since the kingdom began, and since 1858 a number of Greek wines have become of commercial importance. The best vineyards of Livadia are near Lepanto, Chæronea, Megara, and on the slopes of mount Poligouna. Achaia, the northern part of the peninsula Morea, has extensive vineyards near Patras, Blattero, Voltizza, and Kalavrito. Near the latter town is the convent of Megaspileon, where the monks make and keep wines in large quantities. The best wine of the Morea is made near Pergos. The volcanic island Santorin, ancient Thera, produces from 9,000 to 11,000 pipes annually. The best red growth is called *Santorin*, and among the white wines, *Thera*, *Calliste* and *St. Elie* are the best known. Besides these, there is a muscadine wine, named *Vin Santo*, made of two colors. Among the islands of the Archipelago producing wines or raisins are: Skopelos, Skiatho, Skyro, Mykonos, Negropont, Andro, Tino, Thermia, Naxia, and Amorgo. A considerable quantity of wine is produced by the Turkish islands, Candia and Rhodes, and by Cyprus which is now governed by Great Britain.

GREELEY, a co. in e. Dakotah, formed after the census of 1870; 750 sq.m. It is very little settled. It is mostly prairie, and the soil is fertile.

GREELEY, a co. in w. Kansas on the Colorado border; organized after 1870; about 700 sq.m. It is level and with very little woodland.

GREELEY, a co. in central Nebraska formed after the census of 1870: on the Loup, a branch of the Platte river; 576 sq.m.; pop. '76, 194. It has a prairie surface, and the soil is fertile. Co. seat, Lamartine.

GREELEY, a t. in Weld co., Col., on Cache river, and the Denver and Pacific railroad, 52 m. n.e. of Denver; pop. about 2,000. It is in a valley of rare fertility, and enjoys a very pleasant climate. The schools of the town are of a superior order, and there are many important manufactories. It was founded in 1870 by a colony mainly from New York, and every care was taken to prepare for a large city in the future.

GREELEY, HORACE, American journalist, was b. at Amherst, N. H., Feb. 3, 1811. His father was a farmer of small means: and Horace, after acquiring the rudiments of education at a common school, entered a printing-office as an apprentice, 1825, at Poultney, Vermont. On the completion of his apprenticeship, he worked for some time as a journeyman printer, and in 1834 commenced the *New Yorker*, a literary weekly paper, for which he wrote essays, poetry, and other articles. After one or two other essays at editorship, he began in 1841 the *New York Tribune*, of which he has ever since been the leading editor. As Mr. Greeley had adopted, to some extent, the social theories of Fourier, he was joined by the most able writers of that school of socialism, and the paper is published as a joint-stock concern, being held in shares by its writers and others engaged in its publication. The *Tribune* has also been an earnest advocate of temperance, women's rights, the abolition of slavery and capital punishment, and other reforms, and is recognized as the organ of the extreme or radical republican party. In 1848 Mr. Greeley was elected to congress from one of the districts of New York, for the short term, but failed in his congressional career by agitating an unwelcome reform in the mileage payments to members. In 1851 he visited Europe, and was chairman of one of the committees of the great exhibition. His aspirations to political position were defeated by the more conservative party leaders, and he, in turn, is supposed to have secured the election of Mr. Lincoln, instead of Mr. Seward, in 1860. On the secession of several of the southern states from the union, Mr. Greeley at first advocated their right to secede, in accordance with the principles of the Declaration of Independence: but when the war began, he became one of its most zealous advocates, and is supposed to have caused the premature advance that resulted in the defeat of

Bull's Run, July 21, 1861. In 1872 he was an unsuccessful candidate for the presidentship, and died the same year.

GREELEY, HORACE (*ante*), the eminent American journalist, never enjoyed the advantages of collegiate education, but he was an apt scholar and made the most of such opportunities for acquiring knowledge as were within his reach. His father was a poor, unprosperous farmer, and the boy, in his earliest years, was put to hard work. But he had an insatiable fondness for books, and every minute that he could spare from work or sleep was devoted to reading, and what he read he remembered. He neither shirked nor slighted any task, but did properly and well whatever the needs of the family required at his hands, the hope of finding time for reading acting as a constant stimulus to his fidelity. He made more of the scanty advantages of an ill-furnished country printing-office than some young men do of the opportunities afforded by a richly endowed college. The offer of "leading men in the neighborhood" to bear his expenses in a college course was doubtless declined by his parents not from any lack of appreciation of the advantages of such an education, but partly because they needed his services at home and partly on account of the pride which would not permit them to receive such a boon as an act of charity. However this may be, it is to be lamented that a man so richly endowed by nature did not receive the best education the country could furnish. His early interest in political, industrial, and social questions was fortunate, for it was this that led him to qualify himself for a career of eminent usefulness. He brought to the discussion of such topics not the ambition of an office-seeker or the arts of the demagogue, but a strong desire and purpose to secure the highest welfare of the whole people. If he was not always right on current questions, nor always free from the impetuosity which too often mars the efforts of reformers, he discussed those questions with a vigor and intelligence not often exhibited by the conductors of political journals in his day. A high moral purpose was at the bottom of every form of political and social activity to which he lent his support. He was a partisan, with many of the faults which must ever spring from that bitter root, but few men have ever enjoyed in a higher degree than himself the respect and confidence of his political opponents. When he came to New York in 1831, a boy of 20 years, poorly clad, with only $10 in his pocket, his aspirations were of the noblest sort, his character unsullied, his mind well informed upon many subjects of the highest interest. Every step from the obscurity of that period to the eminence he afterwards attained was perfectly natural. The *Morning Post*, the first penny daily ever published, was marked by that genius for editorship which he possessed in so high a degree. It failed not for lack of intellectual strength. *The New Yorker*, which lived for seven years and was finally merged in the *Weekly Tribune*, was confessedly the best literary newspaper in America at that period. The *Log Cabin* showed for the first time how a campaign paper may be made a vehicle of instruction as well as a means of political excitement. These all, naturally enough, prepared the way for *The Tribune*, which was founded in 1841, and which is the noblest monument to his fame. In his *Recollections of a Busy Life* he says: "Fame is a vapor; popularity an accident; riches take wings; the only earthly certainty is oblivion; no man can foresee what a day may bring forth, while those who cheer to-day will often curse to-morrow: and yet I cherish the hope that the journal I projected and established will live and flourish long after I shall have molded into forgotten dust, being guided by a higher wisdom, a more unerring sagacity to discern the right, though not by a more unfaltering readiness to embrace and defend it at whatever personal cost; and that the stone which covers my ashes may bear to future eyes the still intelligible inscription, Founder of the *New York Tribune*." In 1848 he was elected to congress to fill a vacancy, serving from Dec. 1 of that year to March 4, 1849. He distinguished himself by an uncompromising but unpopular war against the abuses of the mileage system, thereby incurring the bitter hostility of not a few of his own party. In this as in many other instances he was careless of his own popularity and bent only upon promoting the public welfare. He was warmly interested in every movement which seemed to him likely to improve the condition and enlarge the opportunities of the toiling poor, and his paper was ever open to the consideration of such themes. When the North American Phalanx was organized, in 1843, near Red Bank, N. J., in part upon the principles of Charles Fourier, the French socialistic reformer, he gave it such aid as lay in his power. He opened the columns of *The Tribune*, to a limited extent, to an exposition and defense of Fourier's general plan, though dissenting very earnestly from some of his doctrines. He was intolerant of every assault upon the institution of the family, prompt to denounce every sentiment and practice inconsistent with the highest standard of social purity. He was quick to discern and point out the evils and abuses of existing institutions, but he was neither a revolutionist nor an iconoclast. He recognized the law of growth and development in human society, and, having done what he could to diffuse right principles, awaited the result with a cheerful confidence in the Providence that watches over human affairs. He lectured much in different parts of the country, generally upon topics of social and political reform; and, though utterly destitute of the qualities of an orator, the respect entertained for his character and opinions was always sure to command for him a wide and favorable hearing. Agricultural and manufacturing industries engaged much of his attention, and few men in his day did

more than he to promote their development. He served as one of the American jurymen at the great London exposition of 1851, and before returning home traveled through France, Italy, and Great Britain. In 1855 he went to Europe for the second time, spending six weeks in Paris, where he was imprisoned for two days, being prosecuted by a French sculptor, to recover compensation for damages done to a statue in the New York world's fair of 1853, of which he was a director. He was liberated in the regular course of judicial proceedings. If he had depended for his freedom upon the clemency of the emperor, his imprisonment would in all probability have been prolonged; for that monarch could hardly have been expected either to forget or forgive the American editor who had so conspicuously and persistently denounced as an indescribable infamy the *coup d'état* of 1851. Though not in the technical sense of the word an abolitionist, Mr. Greeley was an opponent of slavery, and foremost among those who sought to resist its extension to the territory acquired from Mexico. From 1850 to the end of the conflict, *The Tribune*, under his direction, did much to inform and invigorate the anti-slavery sentiment of the northern people, and to prepare them for the great struggle that ensued. When, after the election of Lincoln in 1860, the south threatened to secede from the union, he frankly declared that if a majority of the people of any state, after full and free discussion, should sincerely and deliberately vote to withdraw, he was willing they should do so. But he held that the votes actually taken at the south did not express the real convictions of the majority, but were the result of terrorism and panic; and when the rebellion broke out, he lent his voice and influence to the support of the government in its efforts to suppress it by force. He had a keen sense of the horrors of a civil war, and was willing to adopt any reasonable and rational plan to avert them. His belief was that if any of the states should deliberately decide to secede, they would soon come to their senses and return to the union, and that this would be better than war. But when nearly the whole south gave itself up to the frenzy of secession and rebellion, he saw at once that the north had no other honorable alternative than a prompt and forceful resistance. The war once begun, he was in favor of its vigorous prosecution, and impatient with what seemed to him unreasonable slowness on the part of the government. At times he was much discouraged, and disposed to think that, to avoid worse calamities, the war should be ended by some compromise short of the result most to be desired. It was this feeling that made him willing to go to Canada, in 1864, with the unofficial sanction of Lincoln, to hold a fruitless conference with George N. Sanders, Jacob Thompson, and Beverly Tucker, the confederate agents on the subject of peace. At the close of the war he advocated the doctrine of universal amnesty and universal suffrage. In other words, he held that there should be no civil penalties inflicted upon those who had taken part in the rebellion, and that negroes should be admitted to vote on equal terms with the whites. He held that the prolonged imprisonment of Jefferson Davis, without indictment or trial for any offense, was a palpable infraction of the sixth amendment of the constitution, which declares that "in all criminal prosecutions the accused shall enjoy the right to a speedy and public trial by an impartial jury of the state and district wherein the crime shall have been committed;" that the government was bound either to try or release him at once; and that to make a martyr of him by an imprisonment not warranted by law was a gratuitous aggravation of the obstacles to reconstruction, and a stigma upon the character of the republic. He therefore joined with Gerrit Smith and others in signing the bail-bond of Mr. Davis, whereby he and they became responsible to the government for his appearance to answer any indictment that might be found against him. This act, in the then state of public sentiment at the north, brought upon him much odium, but he was always proud of it as right in itself and calculated to promote the best interests of the country. It certainly was an act which demanded a high degree of moral courage for its performance. In 1861, not by any agency of his own, but doubtless with his own consent, he was a candidate for the republican nomination for U. S. senator, but was defeated by Ira Harris. In 1864 he served as a presidential elector, voting for the re-election of Lincoln. In 1869 he was the republican candidate for comptroller of the state of New York, but was defeated, the democrats being then in power in the state. In 1870 he was a candidate for congress in the 6th New York district, but without any chance of success, the district being overwhelmingly democratic. He ran 300 votes ahead of the republican state ticket. It is said by men who shared his confidence, that while he was too proud to be an applicant for any office or to take any step to secure a nomination, he yet very keenly felt the neglect of others to recognize his honorable claims for promotion upon the parties he served so faithfully and well. This view of his character finds striking confirmation in a private letter addressed by him, Nov. 11, 1854, to gov. Seward. When, in 1860, Mr. Seward, largely no doubt through Mr. Greeley's influence, failed of a nomination for the presidency, he permitted his friends to make public allusions to the contents of this letter as affording evidence that Mr. Greeley's opposition to himself was of a selfish and personal character. Mr. Greeley thereupon demanded the publication of the letter, in which, under the seal of privacy, he reminded gov. Seward of what he had done for the whig cause in 1838, and then said: "I was a poor young printer. . . . I did the work required to the best of my ability, and I did it well. When it was done, you were governor, dispensing offices worth $3,000 to $20,000 per year to your friends and compatriots. I

returned to my garret and my crust, and my desperate battle with the pecuniary obligations heaped upon me by bad partners in business and the disastrous events of 1837. I believe it did not then occur to me that some one of those abundant places might have been offered to me without injustice; I now think it should have occurred to you." And then he referred to his services for the party in the Harrison campaign of 1840, which had been requited after the same fashion. After the election was over, he says, "came the great scramble of the swell mob of corn minstrels and cider-suckers at Washington, I not being counted in. . . . I asked nothing, expected nothing; but you, governor Seward, ought to have asked that I be postmaster of New York." It was for reasons such as these that he notified gov. Seward of "the dissolution of the political firm of Seward, Weed, and Greeley, by the withdrawal of the junior partner," and the breach thus made was never healed. In 1872 Mr. Greeley was opposed to the renomination of gen. Grant for a second term, and co-operated with a body of "liberal republicans," who held a convention in Cincinnati, on the 1st of May, in advance of the regular republican convention, to nominate another candidate. On the 6th ballot the nomination fell to Mr. Greeley, and was by him accepted. The platform of the "liberal republicans" affirmed in their entirety and in vigorous terms the cardinal principles of the republican party itself. It recognized the equality before the law of all men, of whatever nativity, race, color, or persuasion; it pledged its supporters to maintain the union, emancipation, and enfranchisement, and to oppose any re-opening of the questions settled by the latest amendment to the constitution; it demanded the immediate and absolute removal of all disabilities imposed on account of the rebellion, in the belief that universal amnesty would result in the complete pacification of all sections of the country; it declared that local self-government, with impartial suffrage, would guard the rights of all citizens more securely than any centralized power; it declared that the public welfare required the supremacy of the civil over the military authority; freedom of persons under the protection of habeas corpus, and a return to the methods of peace and the constitutional limitations of power; it demanded a thorough reform of the civil service, which had become a scandal and reproach upon free institutions, and a source of demoralization dangerous to the perpetuity of republican government; and, finally, it declared that the public credit must be sacredly maintained, denounced repudiation in every form and guise, and demanded a speedy return to specie payment, as demanded alike by the highest considerations of commercial morality and honest government. Upon this basis the convention invited the co-operation of all patriotic citizens without regard to previous affiliations. Whatever may be the judgment of posterity as to the wisdom of Mr. Greeley in allowing himself under the circumstances to be made a candidate for president upon such a platform, it is only just to say that he understood himself to have reaffirmed the very principles for which he had contended as a republican, and to have neither made nor proposed any concession whatever to those who had opposed and resisted them. When the democratic party adopted that platform in its entirety and without qualification, and nominated him as their candidate for president, he accepted their action as the sign and pledge of a new departure, and believed that if he should be elected there would be an end of all political schemes having their root in the spirit of slavery and calculated to array the south against the north. Whether he was or was not deluded in this regard, there is no reason to doubt his entire sincerity and good faith in the course he pursued. Nor is there any reason to wonder that he was deeply wounded, disappointed, and mortified in finding himself accused by many of his old friends of having thrown away his principles and entered into a foul conspiracy to turn over the government of the country to the control of the men who had instigated the rebellion. It may be said that this accusation was alike natural and plausible, and that it was a weakness on his part not to have anticipated it; and perhaps this is all true. But those who stood near him in that conflict affirm that it was not his defeat as a presidential candidate, but the cruel impeachment of his integrity by old friends, that wounded his spirit past all healing. The popular vote cast for him amounted to 2,834,079, against 3,597,070 for gen. Grant; but the only states carried by him were Georgia, Kentucky, Maryland, Missouri, Tennessee, and Texas.

He had overtasked his powers for many years. Near the close of the campaign he was required to watch at the bedside of his dying wife. During the whole contest his powers of endurance were strained to the utmost, and when it was at last over, he was prostrated by a disorder of the brain and sank rapidly into the arms of death. The sad event made a very profound impression upon the country, and showed how deeply he was admired and loved by good men of all parties and every variety of opinion. His body lay in state in the city hall for one day, where it was visited by a vast multitude of people, many of whom lingered for hours in the slow-moving procession for an opportunity to look upon his dead face. His funeral was simple but very impressive, and was attended by the president and vice-president of the United States, and many other persons of distinction. He died as he had lived, in the faith of Universalism. His published volumes are as follows: *Hints Toward Reforms* (1850); *Glances at Europe* (1851); *History of the Struggle for Slavery Extension* (1856); *Overland Journey to San Francisco* (1860); *The American Conflict* (2 vols., 1864–66); *Recollections of a Busy Life* (1868); *Essays Designed to Elucidate the Science of Political Economy* (1870); and *What I*

Know of Farming (1871). His life was written by James Parton in 1855, and a new edition appeared in 1868.

GREEN, a co. in s. central Kentucky on Green river; 525 sq.m.; pop. '70, 9,379—1937 colored. It has a hilly surface, and is largely covered with forests. The main productions are tobacco. wheat, corn, oats, and butter. Co. seat, Greensburg.

GREEN, a co. in s. Wisconsin, on the Illinois border, drained by Sugar and Pecatonica rivers, and reached by a branch of the Milwaukee and St. Paul railroad; 576 sq.m.; pop. '70, 23,611. The surface is diversified with hills and prairies, and timber is plenty. The main productions are wheat, corn, oats, hay, butter, and pork. Co. seat, Monroe.

GREEN, ASHBEL, D.D., LL.D., 1762–1848; b. N. J.; educated in the college of New Jersey. He was tutor and professor of mathematics and natural philosophy at Princeton; Presbyterian pastor in Philadelphia; member of the general assembly; chaplain to congress, and one of the founders of the first Bible society in the country—in Philadelphia. From 1812 to 1822 he presided over the college of New Jersey, and for 12 years afterwards was editor of the *Christian Advocate*. He and others originated the now famous theological seminary in connection with the college at Princeton. Besides these he filled several other important offices, and had great influence in the affairs of his denomination. He published a history of Princeton college, and a few lectures.

GREEN, BARTHOLOMEW, 1666–1732; b. Mass.; the first printer of a regular newspaper in North America (see AMERICAN JOURNALISM). In 1704 he started a small weekly, the *Boston News-Letter*, which he continued as long as he lived.

GREEN, DUFF, d. 1875; long known in Washington as the editor of democratic newspapers. He was a warm supporter of president Jackson, and so extreme in his methods of expression that he became involved in a number of duels, one of which was with James Watson Webb, editor of the *New York Courier and Enquirer*. None of Green's duels had any very serious results.

GREEN, HENRY WOODHULL, LL.D., b. N. J., 1804; graduated at Princeton, and soon became an eminent lawyer. In 1846 he was made chief justice of the state supreme court, and in 1860 chancellor. In 1867 he was on a commission to codify the laws of the state. He was at one time president of the board of trustees of Princeton theological seminary.

GREEN, HORACE, LL.D., 1802–66; b. Vt., and educated at Middlebury college; studied medicine and practiced in his state; finally settled in New York, and completed his medical studies in Paris. He was professor in a medical college at Castleton, Vt. In 1850 he was one of the founders of the New York medical college, became one of the faculty, and was professor of the theory and practice of medicine. He published a number of works chiefly on diseases of the air passages and lungs, and *Selections from the Favorite Prescriptions of Living American Physicians.*

GREEN, JACOB, 1722–90; b. Mass.; educated at Harvard and Princeton, and in 1745 licensed to preach by the New York presbytery. In 1757 he was vice-president of Princeton college. In 1775 he was a member of the provincial congress, and chairman of the committee that drew up the state constitution. Among his works are *A View of the Constitution of the Jewish Church*, and *A View of a Christian Church and Church Government.* His autobiography was published by his son.

GREEN, SAMUEL, 1615–1702; b. England; one of the first printers in the English American colonies, succeeding Stephen Day at Cambridge, Mass., in 1648. He printed the Bible, the colonial laws, Baxter's *Call*, and several other works in the Indian language for John Eliot, the missionary.

GREEN, SETH, b. New York, 1817; especially noted for his efforts in fish culture. He entertained the idea of cultivating or breeding the better kinds of fish to stock lakes and streams then barren. After many experiments he succeeded in hatching enormous numbers from the spawn of shad, trout, and other kinds, with which he stocked the Connecticut, the Hudson, the Potomac, the Susquehanna, and a great number of less important streams. His work became so popular that state associations were formed to further his purpose, and honors from France and other countries were awarded to the originator. He has published one or more works on the subject of fish culture. For several years he has been commissioner of fisheries of the state of New York.

GREEN, WILLIAM HENRY, D.D., LL.D., b. N. J., 1825; graduated at Lafayette college, Penn., and studied at Princeton theological seminary, where he was teacher of Hebrew. In 1848 he became a Presbyterian minister, and pastor of the Central church in Philadelphia the next year. In 1851 he became professor of Hebrew and Old Testament literature in Princeton theological seminary. In 1868 he was elected president of the college of New Jersey, but declined the office. He is one of the committee on the new English translation of the Bible. His publications are *Hebrew Grammar; Hebrew Chrestomathy; The Pentateuch Vindicated;* and *The Argument of the Book of Job Unfolded.*

GREEN, WILLIAM MERCER, D.D., LL.D., b. N. C., 1798; graduated at the state university, and was ordained in the ministry in 1820. In 1849 he was chosen bishop of Mississippi (Prot. Epis.). He was one of the promoters and founders of the university of the south at Suwanee, Tenn., and chancellor thereof. His main work is *Sermons on Apostolic Succession and Baptismal Regeneration.*

GREEN'BACKS. During the civil war in America from 1861 to 1865, the immense expenditure of the U. S. government led to the printing of an unprecedented number of bank-notes, bonds, and currency papers of various kinds. These documents, from the color presented by them, or some of them, obtained the name of *greenbacks*, a designation which became almost as familiarly used in congress as among the general public. At first, the manufacture of these notes taxed the resources of the government in a very embarrassing way; and there was ample reason to suspect that forged notes and bonds were abundantly in circulation; but, by degrees, a fine and large establishment was organized at Washington, under the immediate control of the secretary of the treasury. In this establishment, everything was conducted from first to last; rags, fibers, plates of steel, and colors were taken in, and finished notes were sent out. It was only under very rare circumstances that strangers were admitted to view the operations; but one such occasion, in 1864, led to a general description of the place being given in most of the newspapers, from which it was copied into some of the English scientific journals.

Speaking of the establishment as it was in 1864, and not touching upon any of the modifications which may since have been introduced, there were distinct and separate departments for mechanical repairs, paper-making, ink-making, paper-wetting, plate-engraving, printing, numbering and denominating, and cutting. In the paper-mill, all the paper for the greenbacks was made, with a degree of scrupulous attention and uniformity that cannot always be insured in a private establishment. It was necessary to have a paper that would wear well, would not split easily, and would be sufficiently non-photographic to baffle a forger. Dr. Gwynn made many experiments, with a view to attain excellence on these points; and at length he produced a kind of paper nearly as strong as parchment and as smooth as satin. The nature of the material was known only to himself and the government. There was a fiber in the paper, quite molded or felted into its substance, which could not be photographed without discoloring the sheet to which it was transferred, giving it the appearance of a coarse, black spider-web, which would instantly have betrayed the forgery. In another department, the ink was made by means of grinding-machines, one for each of the several colors used in the various kinds of notes and bonds. While these operations of paper-making and ink-making were in progress, the engraving of the plates was conducted in another department. The steel-plates were engraved with the most minute and intricate devices which the hand and the eye of the artist could execute: it mattered little what device was selected, provided it were difficult for a forger to imitate. One particular note was, in its main features, an engraved copy of a picture in the rotunda of the capitol at Washington; and the engraving is said to have occupied a whole year to execute. All the devices, of whatever kind, were made to co-operate with delicate water-lines in the paper, to render forgery difficult. As the plates were costly to engrave, and fitted to yield only a certain (though large) number of impressions each, a mode of multiplication was adopted which had for many years been largely used in England. The processes were thus connected: 1. The engraver executed the design on a smooth plate of soft steel. 2. The plate was hardened by well-known processes of heating and cooling. 3. A roller of soft steel was pressed with immense force over the hardened plate, and took upon its surface the device in *relief:* as the roller was equal in length to the length of the plate, and equal in circumference to its breadth, the curved surface exactly took in the whole of the device. 4. The roller was hardened. 5. The hardened roller was used as a matrix to produce any number of plates in soft steel, which had the device in *intaglio*, like the original plate. 6. These plates, when hardened, were used to print from.

The paper, the ink, and the plates being thus prepared, all was ready for the printing. In the earlier period of the working of the establishment, presses were used such as are generally employed by copperplate printers; each press attended by a woman to place and remove the paper, and a man to manage the inking and the pressure; but afterwards, a large room was filled with hydraulic printing-presses, which conducted the operations much more rapidly. The notes, as fast as printed, were interleaved with sheets of thin brown paper, to prevent blurring. In numbering and denominating the notes, a yellow mordant was employed, of such kind that the note could not be photographed without producing a black impression from the yellow portion. The numbering-machine was worked by a treadle; there were six disks with figures on their edges, and they so acted on each other by means of ratchets, that they could print any number from 1 to 999,999. For consecutive numbering, the machine adjusted its own figures after each printing. The notes were usually printed four on a sheet, and were afterwards severed and trimmed by a cutting-machine, which made them all precisely equal in size and shape. So complete was the check established in all the operations, that "not even a blank sheet," said a narrator, "much less a printed one, is passed from one hand to another without being counted and receipted for; and unless there is collusion from one to another in every process through which the paper has to pass before it is finished, there cannot be an over-issue. The paper is issued from one room, and is re-issued from that room sixteen or eighteen times before it is put into circulation; being counted, charged, and receipted for each time, and recounted, recharged, and re-receipted for through each process that it passes after leaving that room." For the English system, see BANK-NOTES.

GREEN BAY, a branch of lake Michigan running s.s.w. into Wisconsin nearly 100 m. having a breadth of 10 to 20 miles. The largest stream falling into the bay is Fox river at the extreme s. end.

GREEN BAY, a city in Brown co., Wis., on Fox river and Green bay, on the Chicago and Northwestern, the Wisconsin Central, and the Green Bay and Minnesota railroads; pop. '75, 8,037. There is a good harbor, a bridge over the river, a court house, a high school, a Roman Catholic academy and convent, and residence of a bishop of that church; many iron works, mills, and factories. Lumber is one of the great articles of trade, and the grain traffic is also large. The French settled here in 1745; the city was incorporated in 1854.

GREENBRIER, a co. in s.e. West Virginia, on Meadow and Greenbrier rivers, and the Chesapeake and Ohio railroad, n.w of the Alleghany mountains; 880 sq.m.; pop. '70, 11,417—1103 colored. The surface is rough with good timber. Corn, wheat, oats, and hay, are the main products. White Sulphur Springs in this co. is a favorite resort in the summer season. The co. is crossed by Greenbrier river, the chief tributary of the Great Kanawha, and by sections of the Greenbrier mountains. Co. seat, Louisburg.

GREENBUSH, or EAST ALBANY, a village in Rensselaer co., N. Y., on the Hudson river opposite Albany, to which city there is the bridge of the New York Central railroad; pop. of township '75, 7,066. The Boston and Albany, and the Troy and Greenbush railroads terminate here. The main business is with railroad affairs, such as freight depots, machine shops, etc. There are some other manufactories.

GREENCASTLE, a city in Putman co., Ind., on the Louisville, New Albany and Chicago railroad, at the junction of St. Louis and Terre Haute, and Indianapolis roads, 38 m. w. of Indianapolis; pop. (with township) '70, 3,227. There are some important manufactories in the village, and it is the seat of the Indiana Asbury university (Meth. Epis.), the Indiana female college, and a Presbyterian educational institute. There are manufactures of iron, pumps, machinery, etc.

GREEN CLOTH, BOARD OF; a board connected with the royal household, consisting of the lord steward and inferior officers, which has power to correct offenders within the verge of the palace, and two hundred yards beyond the gates. A warrant must be obtained from this board to enable a servant of the palace to be arrested for debt.

GREEN COLORS. Although every shade of green can be produced both in oil and water-colors, and also in dyeing, most of them are made by mixing the various yellow and blue materials in different proportions. The following are the green paints in use:

Arsenical green, or Scheele's green, is an arsenite of copper, made by dissolving arsenious acid in a solution of potash, and adding it to a solution of sulphate of copper. A precipitate is formed, which is *Scheele's green*, or *Mitis green*.

Brunswick green.—The best is crude oxychloride of copper, but the kind commonly sold is a mixture of carbonate of copper and chalk, or pipe-clay. One shade of this mixture is sometimes called *Bremen green*.

Chrome green is a mixture of Prussian blue and chrome yellow.

Copper green is sometimes a natural product, but is more generally manufactured; it is the oxide or the carbonate of copper, and is sometimes called *green bice* or *mountain green*.

Emerald green is an arsenite of copper, prepared by a slightly different process to *Scheele's green*.

Frise or *Friesland green* is made with sulphate of copper and sal-ammoniac.

Gellart's or *Gellert's green* is amixture of *cobalt blue*, flowers of zinc, and *chrome yellow*.

Sap green—the juice of buck-thorn berries fermented for seven or eight days, after which a little alum is added; and when evaporated to a thick consistency, it is pressed into bladders, and hung up until entirely dry. It is chiefly employed in water-colors.

Schweinfurth green is another form of the arsenite of copper produced by dissolving separately equal parts of acetate of copper and arsenious acid. The solutions are then added together quite hot, and the precipitate formed is the beautiful but highly dangerous pigment. Its great beauty has led to its frequent employment in coloring wall-papers, artificial flowers, and even in some cases, it is to be feared, in coloring sugar-confections.

All of these colors, with the exception of sap green are dangerously poisonous.

Green, in dyeing, is always understood to be a mixture of the two colors blue and yellow. The materials are generally mixed first with blue, and afterwards with yellow, proportioning the intensity of each to the shade of color required.

The Chinese have a vegetable green color called *luh-kao*, or green indigo, but it is exceedingly costly, and is only obtainable in very small quantities.

GREENE, a co. in n.w. Alabama between the Tombigbee and black Warrior rivers, crossed by the Alabama and Chattanooga railroad; 750 sq.m.; pop. '70, 18,399—14,541 colored. The surface is generally level, with a large proportion of woodland; soil fertile, and chief productions corn and cotton. Co. seat, Eutaw.

GREENE, a co. in n.e. Arkansas on the border of Missouri, between the Cache and St. Francis rivers; reached by the Cairo and Fulton railroad; 950 sq.m.; pop. '70, 7,573

—156 colored. The surface is low and level, producing corn and cotton. Co. seat, Gainesville.

GREENE, a co. in n. Georgia on the Appalachee and Oconee rivers, crossed by the Georgia railroad; 374 sq.m.; pop. '80, 17,547—11,969 colored. The surface is hilly, and the soil is much worn from long cultivation. The main products are cotton and corn. Co. seat, Greensborough.

GREENE, a co. in w. Illinois, e. of Illinois river, intersected by the St. Louis, Rock Island and Chicago, and the Chicago and Alton railroads; 500 sq.m.; pop. '80, 23,014. The surface is varied, and in some parts hilly, with forests of oak, hickory, and other valuable trees. Corn, wheat, and pork are the principal products. There are good beds of soft coal, and fine limestone for building. Co. seat, Carrollton.

GREENE, a co. in s.w. Indiana on the w. fork of White river, crossed by the Indiana and Vincennes, and the Bedford, Springfield, Owensburg and Bloomfield railroads; 540 sq.m.; pop. '70, 19,514. The surface is generally level and covered to a large extent with forests. The soil is fertile, producing wheat, corn, oats, etc. There are some coal mines. Co. seat, Bloomfield.

GREENE, a co. in w. central Iowa on Raccoon river, crossed by the Chicago and Northwestern, and the Des Moines and Ft. Dodge railroads; 576 sq.m.; pop. '75, 7,028. It has a prairie surface partially covered with forests, and a fertile soil. Chief productions corn, wheat, oats, and hay. Co. seat, Jefferson.

GREENE, a co. in s.e. Mississippi, on the Alabama border, drained by the Leaf and Chicasaw rivers; 825 sq.m.; pop. '70, 2,038—372 colored. The surface is for the most part covered with forests, and the soil is poor. Co. seat, Leakesville.

GREENE, a co. in s.w. Missouri on James and Sac rivers, crossed by the St. Louis and San Francisco railroad; 660 sq.m.; pop. '70, 21,549—2,156 colored. It has an undulating and hilly surface, to a considerable extent covered with forests. The soil is good, producing corn, oats, wheat, etc. Co. seat, Springfield.

GREENE, a co. in e. New York on the n. side of the Hudson river, drained by the Schoharie and Catskill creeks; area 600 sq.m.; partially crossed by a branch of the New York Central railroad; pop. '75, 31,832; in '80, 34,625. The surface is tolerably level near the river, but further w. rises into the Catskill range of mountains, some of which are 2,000 to 3,000 ft. above tide. (See CATSKILL MOUNTAINS.) Some cereals are raised, but the land is better adapted to pasturage. Geologically the rocks in this co. are especially interesting. Co. seat, Catskill.

GREENE, a co. in e. central North Carolina, drained by stream running into Neuse river; 300 sq.m.; pop, '70, 8,687—4,521 colored. It has a level surface partially covered with forests, and the soil is in some parts fertile. Corn and pork are the chief productions. Co. seat, Snow Hill.

GREENE, a co. in s.w. Ohio on Little Miami and Mad river, crossed by the Pittsburgh, Cincinnati and St. Louis railroad; 430 sq.m.; pop. '70, 28,038. The surface is undulating or hilly, and forests are abundant. The soil is good; chief productions, corn, wheat, oats, and pork. Co. seat, Xenia.

GREENE, a co. in s.w. Pennsylvania on the West Virginia border, w. of the Monongahela river and drained by the Wheeling and Ten Mile creeks; 620 sq.m.; pop. '70, 25,887. It has a rough and hilly surface with considerable forests. The soil is good; corn, wheat, hay, oats, and pork are the staple products. Co. seat, Waynesburg.

GREENE, a co. in e. Tennessee on the North Carolina border, drained by affluents of French Broad river, and crossed by the East Tennessee, Virginia and Georgia railroad; 750 sq.m.; pop. '70, 21,688—2,064 colored. The surface is in part mountainous but the valleys are fertile, producing corn, wheat, oats, etc. There are iron mines, and beds of limestone. Co. seat, Greenville.

GREENE, a co. in n. central Virginia between the Blue Ridge and the Rapidan river; 220 sq.m.; pop. '70, 4,634—1,452 colored. Surface is rough, with fertile valleys; chief products, corn, wheat, and oats. Co. seat, Stanardsville.

GREENE, CHARLES GORDON, b. N. H. 1804; apprentice to his brother Nathaniel. In 1825 he published at Taunton, Mass., the *Free Press;* in 1826, the *Boston Spectator;* then returned to the *Boston Statesman;* in 1828, was one of the editors of Duff Green's paper, the *Telegraph* of Philadelphia; succeeded his brother as editor of the *Boston Statesman;* and in 1831 began the *Boston Post,* a strongly democratic daily and weekly, which he edited until his death.

GREENE, CHRISTOPHER, 1737-81; b. R. I.; an officer in the revolutionary army rising to lieut.col. He went with Arnold through the wilderness and was taken prisoner at Quebec, but was soon exchanged. He defended Fort Mercer (at Red Bank on the Delaware) Oct. 21, 1777, against the Hessians who were repulsed and their commander killed. In May, 1781, he was surprised in his quarters on Croton river by a force of refugees and killed.

GREENE, GEORGE WASHINGTON, b. R. I., 1811; studied at Brown university, and resided for some time in Europe. In 1837–45 he was U. S. consul at Rome, and in 1872 he was made professor (non-resident) of American history in Cornell university. His principal works are *Ancient Geography; History and Geography of the Middle Ages; Life of Gen. Nathaniel Greene* (his grandfather); *Historical View of the American Revolution;* and *Biographical Studies.*

GREENE, NATHANIEL, an American revolutionary gen., b. May 27, 1742, at Potowhommet, Warwick co., R. I. His father was a leading preacher among the Quakers, and educated his son very simply, training him from childhood to work on his farm, and at his anchor-forge and grist-mill. By his own perseverance, however, he acquired considerable knowledge of ancient and English history, geometry, law, and moral and political science; he was also fond of reading books upon war. In 1770, he was chosen a member of the Rhode Island assembly, and, to the great scandal of his fellow Quakers, was among the first to engage in the military exercises preparatory to resisting the mother-country. In 1774 he enlisted as private, and in 1775 was appointed to the command of the Rhode Island contingent to the army at Boston, with the rank of brig.gen. He was promoted to be maj. gen. in 1775, and distinguished himself at the engagements of Trenton and Princeton. At the battle of Brandywine, he commanded a division, and by his skillful movements saved the American army from utter destruction; and at Germantown he commanded the left wing. In 1778 he accepted the office of quartermaster-gen. In 1780 he succeeded Gates (q.v.) in the command of the army of the south. Gates had just been completely defeated by Cornwallis, and Greene found the army in a wretched state, without discipline, clothing, arms, or spirit. By dint of great activity, he got his army into better condition, and remained on the defensive for the remainder of the year. In 1781 he had a successful skirmish with an English detachment, but drawing upon himself the whole army of Cornwallis, much his superior in numbers, he made a masterly and successful retreat. With 5,000 new recruits he entered upon more active operations, and finally defeated the English at Eutaw Springs, the hardest fought field of the revolution, which put an end to the war in South Carolina. Congress struck, and presented to him, a medal in honor of this battle, and the Carolinas and Georgia made him valuable grants of land. When peace was restored in 1783 Greene returned to Rhode Island, where he received numerous testimonials of the public admiration. In 1785 he retired with his family to his estate in Georgia, where he died of sun-stroke in 1786.

Greene was one of the very best generals of the war of independence, second, perhaps, only to Washington, whose intimate friend he was.

GREENE, NATHANIEL, b. N. H., 1797; was apprentice in the office of the *New Hampshire Patriot*, and at the age of 17 edited the *New Hampshire Gazette;* afterwards the *Gazette* at Haverhill, N. H., and the *Essex Patriot.* In 1821 he started the *Boston Statesman*, a prominent democratic organ. He has published *Tales and Sketches from the German and French*, and *Improvisations and Translations.*

GREENE, ROBERT, an English poet and dramatist, was b. at Norwich about 1560, or, as stated by some of his biographers, in 1550. He was placed at St. John's college, Cambridge, and took out his degree of A.B. there in 1578. He afterwards traveled in Spain and Italy. On his return, he re-entered the university, and took his degree of A.M. at Clare Hall in 1583. He also appears to have studied at Oxford in 1588. On leaving Cambridge, he proceeded to London, where he supported himself by writing plays and romances. He poured out plays, poems, and novels, ruffled about in silks, wore long hair, and haunted taverns and places of questionable resort with such wild and profane geniuses as Marlowe and Peele. He died of the consequences of a debauch, Sept. 3, 1592, and was buried next day in the New church-yard, near Bedlam. After his death appeared the singular pamphlet entitled *The Repentance of Robert Greene, Master of Arts*, in which he lays bare the wickedness of his former life. It is perhaps the most valuable of his prose writings. Greene's poems possess considerable grace and tenderness, but his plays have almost perished from human memory. His *Groat's Worth of Wit bought with a Million of Repentance* contains one of the few authentic contemporary allusions to Shakespeare; and when his writings are forgotten, he will be remembered for it, and for being one of the knot of young men who came up to London when the English drama was creating itself, and who burned themselves out in fierce labor and fiercer dissipation. See Dyce's ed. of Greene (1861).

GREENE, S. DANA, b. Md., 1840; graduated at the U. S. naval academy, and rose to the rank of commander in 1872. In the battle between the *Monitor* and the confederate iron clad *Merrimack* he succeeded to the command when capt. Worden was wounded, and drove the *Merrimack* into Norfolk harbor.

GREEN EARTH, a mineral of a green color and earthy character, often found filling the cavities of amygdaloid, or incrusting agates in that rock, sometimes also massive or disseminated, chiefly in trap rocks. It consists principally of silica, alumina, and protoxide of iron, the silica constituting about one-half. It is used as a pigment by painters in water-colors, who know it by the name of *Mountain Green.* For their use, it is mostly brought from Monte Boldo, near Verona, and from Cyprus. In New Jersey, green earth is used as a manure, and is said to be very beneficial.

GREEN EBONY, a dyewood imported in considerable quantities into Britain from South America. It is the wood of the *jacaranda ovalifolia*, a tree of the natural order *bignoniaceæ*. It yields olive-green, brown, and yellow colors. It is generally imported in pieces about 3 ft. in length; it is a hard wood of an olive-green color, and is sometimes used for purposes of carpentry and by turners. The tree has showy, panicled flowers.

GREENFIELD, a t. in Franklin co., Mass., near the Connecticut river, about 2 m. above the junction of the Deerfield, on the Connecticut river, and the Vermont and Massachusetts railroads; pop '80 (with township), 3,903. The Green and Fall rivers afford ample water-power, and there are several important manufactories, particularly of fine cutlery. In the village are a court-house, several churches, and many excellent schools.

GREENFINCH, *Coccothraustes chloris*, a bird of the family *fringillidæ*, common in most parts of Britain, frequenting gardens, orchards, shrubberies, small plantations, tall hedges, and cultivated lands. It is found even in Scandinavia, but is more common in the s. of Europe; its range extends throughout Asia to the Pacific ocean, and westward as far as Madeira. It is sometimes called *green grosbeak* and *green linnet* (Scot. *green lintie*). The bill is much thicker than that of the true linnets, to which, however, it is nearly allied. A prevailing green tint, mingling with gray and brown, characterizes the plumage, and gives the bird its name. The whole length is little more than six inches. The tail is a little forked. The proper song of the Greenfinch is not very sweet, but in confinement it readily imitates the song of other birds, and in consequence of this and of its very easy domestication, it is rather a favorite cage-bird.

GREENGAGE, a variety of plum, of a green color and roundish shape, the *Reine Claude* of the French, generally esteemed as one of the finest varieties in cultivation, if not certainly superior to all others. It is not of the largest size, but in delicacy and richness of flavor it is unsurpassed.

GREENHEART, or BEBEERU, *Nectandra Rodiæi*, a tree of the natural order *lauraceæ*, a native of Guiana, of great value as a timber-tree, and also yielding a valuable medicinal bark. The timber is commonly called *greenheart;* the bark is better known as *bebeeru* (otherwise *beebeeru*, *bibiru*, *bibiri*, etc., and *sipiri* or *sipeira*), and the alkaloid to which it chiefly owes its properties is called *bebeerine* (q. v.). The tree grows chiefly in British Guiana, and in the greatest perfection on the low hills immediately behind the alluvial lands; it rises with an erect, slightly tapering trunk to a height of 40 or 50 ft. without a branch, attaining a height of 80 or 90 ft. in all, and a diameter of 3 or even 4 feet. The wood is extremely strong and hard, and is imported into Britain, to be used chiefly by turners for the same purposes as lignum vitæ, which it much resembles. It takes a high polish. It is so heavy as to sink in water. It is remarkable for its durability, and for being almost exempt from the attacks of the white ants on land, and of the teredo in water. It is used in Guiana for ship-building, and for all the most important purposes for which timber is required.—The bark is hard, heavy, and brittle, with a fracture resembling that of sandstone, has a white epidermis, and is of a bright cinnamon color within. It has a very bitter, somewhat astringent taste. Its tonic and febrifugal properties resemble those of cinchona bark. Instead of the bark itself, the sulphate of bebeerine is generally used in medicine.

South America produces a number of species of *nectandra*. *N. puchury* yields the seeds called *pitchurim beans*, which are astringent, are regarded as febrifugal, and are prescribed in dysentery, diarrhea, etc., and the oil of which is used as a substitute for chocolate.

GREEN-HOUSE, a building appropriated to the cultivation of such exotic plants as do not require much artificial heat, but cannot endure the open air, at least in the colder part of the year. The name is derived from the original use of such buildings for the preservation of oranges, myrtles, and other evergreens; the cultivation of heaths, pelargoniums, fuchsias, and the many other flowers now familiar to everybody, not having been then introduced. The first green-house of which there is any record was erected about 1619, by Solomon De Caus, at Heidelberg, to shelter orange-trees. The Chinese, however, are not unacquainted with green-houses, and it is not known how long this has been the case. The earlier green-houses were glazed only on the sides; glass roofs were introduced in the beginning of the 18th c., and the arched or curvilinear glass roof, still more favorable to the proper admission of the sun's rays, is an improvement which dates from the early part of the 19th. Heat was at first supplied, when necessary, by hot embers put in a hole in the floor, afterwards by furnaces in the green-house; flues, steam, and hot-water pipes, etc., are more recent inventions. See HOTHOUSE. As a green-house does not require artificial heat during summer, the roof is sometimes made capable of being then removed; more generally, many of the plants are carried out into the open garden. Air is freely admitted into the green-house in fine weather, even in winter, during the warmest part of the day, care being taken that the plants are not exposed to frost, nor to ungenial and chilling winds. Green-houses are sometimes appropriated chiefly to particular genera of plants, under such names as *heathery*, *camellia-house*, etc. According to the present use of the term, a green-house differs from a

conservatory only in the plants being in pots, which are very generally placed on the shelves of *stages*, having a slope not very different from that of the roof.

GREEN ISLAND, a village in Albany co., N. Y., on an island in the Hudson opposite Troy; pop. about 5,000. It connects with both shores by bridges, and has important manufactories for railway cars and machinery, foundries, and a large trade in lumber.

GREEN LAKE, a co. in central Wisconsin, on Fox, Grand, and White rivers, reached by the Milwaukee and St. Paul, and the Sheboygan and Fond-du-Lac railroads; 370 sq.m.; pop. '75, 15,274. The surface is undulating and to a large extent covered with forests. Wheat, corn, oats, hay, and butter are the chief products. Co. seat, Dathford.

GREENLAND, a region of unknown extent northwards, stretches from its southern extremity, cape Farewell (q.v.), along the Atlantic and Arctic oceans on the e., and Davis' strait, Baffin's bay, and Smith's sound on the west. The w. coast pursues a n.n.w. direction as far as cape Alexander, in 78° 10′ n. lat. It then has a general north-easterly direction, gradually changing to easterly beyond 82° 30′. Lieut. Beaumont, of the British Arctic expedition of 1875–76, followed the line of the coast with a sledge-party to 82° 54′ n. lat., and 48° 33′ w. long., when the land was beginning to trend southward. It is thus almost conclusively proved that Greenland is entirely distinct from the land on the w. side of Smith's sound—that in fact Greenland is an island. Previously our knowledge of the western coast was chiefly derived from Dr. Kane, who had assigned cape Alexander, in about lat. 78° 10′ n., as its termination. Greenland is said to have been first discovered about the close of the 9th c. by an Icelander named Gunbiörn, who named it Hvidsaerk (White Shirt), from its snowy headlands. It first obtained the name Greenland from another Icelander, Eric Rauöi (the Red), who led hither an expedition in 985 or 986, and founded two settlements on the w. coast, called the Oestre and Westre Bygd (the e. and w. colonies). About four centuries afterwards, the Westre Bygd was destroyed by the pestilence called the "black death," combined with the attacks of the aborigines; and a century after this, the Oestre Bygd suffered the same fate. Greenland was visited, and its w. coast explored, successively by Frobisher, Davis, and Baffin, the latter having advanced as far as lat. 78° n. (the limit of the inhabited country). In our own times Dr. Kane has extended his explorations as far as lat. 82° 30′, or within 520 m. of the north pole. The eastern and southern coasts appear to be so beset with ice as to be practically inaccessible. The former was explored by Dr. Scoresby as far as lat. 74° 30′ n., and two inlets, Scoresby's sound and Davy's sound, were discovered running far into the interior. This coast-land is called by the inhabitants of the other districts Lost Greenland. Owing to the great extent of land towards the pole, the climate of Greenland is colder than that of corresponding latitudes further e.—so much so, that in Lapland, lat. 72° n., the temperature is as high as in Greenland, lat. 60° north. From observations made by Dr. Kane between Sept., 1853, and April, 1855, in lat. 78° 37′ n., long. 70° 40′ w., the average temperature throughout the year is — 3.22°; from Oct. to April inclusive, — 23.43°; from May to Sept. inclusive, + 25.07°. The greatest degree of cold was — 68° in Feb., and the greatest heat was + 53.9° in July, the only month in which the average temperature was above the freezing-point. During the short summer, which in few places exceeds four months (during two of which, June and July, the sun is always above the horizon), vegetation is very rapid, the plants being for the most part the same as those indigenous to the n. of Scotland, but of a more dwarfish character, the tallest trees not exceeding 18 feet. The inclemency of these regions does not affect the animal kingdom (man excepted). The walrus, seal, polar bear, arctic fox, dog, and reindeer abound, and supply the inhabitants with almost all the necessaries of life. Black cattle and sheep have been introduced by the missionaries. The sea swarms with different species of cetacea, such as the rorqual, mysticetus, narwhal, porpoise, etc., and of fish, as the cod, salmon, and herring. Sea-fowl are also very abundant during the summer season, while guillemots, sandpipers, plovers, and grouse are also found. The only mineral which has been found in sufficient quantity for exportation is cryolite (q.v.), which is found at Arksut, and is largely exported. Near the same locality are found veins of tin associated with ores of lead, copper, zinc, iron, molybdenum, and with cryolite, fluor-spar, zircon, and other minerals. Copper-ore is said to be abundant in various parts, and gadolinite, sodalite, tourmaline, along with garnets, iolite, rock-crystal, etc., are often found. Good coal is found in abundance on the island of Disco.

There are now 13 different Danish colonies along the w. coast of Greenland—7 in north Greenland (n. of lat. 67° n.), and 6 in south Greenland, with a pop. of about 10,000, inclusive of from 200 to 300 Danes. The first settlement was made in 1721, by Hans Egede (q.v.) a Norwegian clergyman at Godthaab, who, with 43 colonists, planted a missionary station in this bleak region. This mission is supported by the Danish government. It now possesses 8 missionary stations, and the Moravians 5; from Julianehaab, the most southern, to Upernavik, at the very verge of human existence. In May, 1874, the first native pastor was ordained. The population depends chiefly on the fisheries—the same which have so long attracted so many vessels from Great Britain. The exports are whale and seal oil, and cryolite; the skins of the seal, reindeer, and

fox; and eider-down. The imports are wheat, brandy, coffee, sugar, tobacco, and firewood. About 10,000 or 12,000 tons of cryolite are annually exported, half going to Denmark and half to the United States. The trade to Greenland has always been a monopoly in the hands of the Danish government. Each settlement is managed by a trader and his assistant, who are paid by government. The whale-fisheries, which are carried on by the settlers, are also for the behoof of the Danish crown.

GREENLEAF, BENJAMIN, 1786–1864; b. Mass.; graduated at Dartmouth, and became principal of Bradford academy and of the teachers' seminary at the same place. He was a member of the legislature in 1837–9. He is best known through his text books on arithmetic, algebra, and surveying.

GREENLEAF, SIMON, 1783–1853; b. Mass.; graduated at Harvard; was admitted to the bar in 1806, and became distinguished as an advocate and jurist. When Maine was separated from Massachusetts he was made reporter of the supreme court of the new state, and 9 vols. of his reports were published. In 1833 he became professor of law in Harvard, and resigned in 1848. Among his works are *Origin and Principles of Freemasonry; Examination of the Testimony of the Four Evangelists by the Rules of Evidence as Administered in Courts of Justice, with an Account of the Trial of Jesus; Treatise on the Law of Evidence;* and *Overruled, Denied, and Doubted Decisions and Dicta.*

GREEN MOUNTAINS, a portion of the Appalachian range. See APPALACHIANS.

GREEN MOUNTAINS (*ante*), the n. extension of the great Appalachian system, covering a large portion of Vermont. Reaching the state near the s.w. corner they form almost an unbroken line through the w. section in the direction e.n.e. They form a continous water-shed, streams from the w. slope going into lake Champlain and those from the e. side into Connecticut river. The Lamoille, Missisquoi, and Winooski rivers make their way through the range and reach the lake. The more important of the peaks and their height above tide are: Mansfield, 4,279 ft.; Camel's Hump, 4,188; Killington, 3,984; and Ascutney, 3,320. The ascent of Killington peak is not difficult, and from the top there is a magnificent view. The mountain is 9 m. from Rutland.

GREE'NOCK, a parliamentary burgh, market-town, and important seaport of Scotland, in the co. of Renfrew, is situated on the southern bank of the Firth of Clyde, on a narrow strip of shore, and on the slopes of the hills which form its background, 22 m. w.n.w. of Glasgow. It extends upwards of 2 m. along the shore, and at one place it climbs to a considerable elevation up the face of the hills, which here rapidly attain an elevation of 800 ft.; while toward the w., and all over the front of the hills, new and elegant villas are continually being erected. From the rising grounds behind the town, and from the western shore, the view of the opposite coasts of Argyle and Dumbarton shires, fringed with white gleaming villages and of the firth stretching away into narrow lochs, and dotted over, especially in summer, with every variety of craft, is exceedingly picturesque and beautiful. The most important buildings are the custom-house, the exchange, the Watt monument containing a statue of Watt by Chantrey, a museum, a lecture-room, and a library, the mechanics' institute, etc. The harbors of Greenock have been constructed upon a large scale—the Albert in 1866; and from it extends westward the fine Princes pier, opened in 1370. Its quays can be approached by steamers, and its harbors entered by vessels at any state of the tide. The commerce of the town is chiefly with North America, and the West and East Indies. The trade is mainly in sugar-refining, for which it has 15 establishments, turning out refined sugars to the value of upwards of £4,500,000 annually. In ship-building, about 20 iron vessels are turned off the stocks annually. There are, besides, manufactures of steam-engines, chain-cables, anchors; and rope and sail making. Greenock has almost constant intercourse with Glasgow by river or railway, and is the general starting-point for tourists *en route* for the western Highlands and isles. It sends one member to parliament. The number and tonnage of vessels which entered and cleared at the port of Greenock for the following two years are returned as follows: In 1871, 3,246 vessels, of 738,231, tons, entered and cleared the port; in 1875, 7,134 vessels, of 1,706,547 tons. The sugar imported in 1830 was 18,357 tons; in 1840, 22,872 tons; in 1850, 45,815 tons; in 1860, 74,289 tons; in 1871, it was 213,090 tons; in 1877, 236,699 tons. The globe sugar-refining company turns out 720 tons a week. The value of foreign and colonial merchandise imported in 1876 was £5,278,155. Pop. '71, 57,821.

Originally consisting of only a few thatched houses, Greenock was created a burgh of barony in 1635 (having then a population of less than 2,000), and a parliamentary burgh after the passing of the reform act in 1832. The prosperity of the town dates from the union in 1707, when free commerce to America and the West Indies was opened up.

GREENOUGH, HORATIO, 1805–52; b. Boston; a self-taught sculptor, befriended by Washington Allston. He was in Italy in 1825; returned in 1826, made some creditable work, and again went to Italy, fixing upon Florence as his abode. Here he worked with great assiduity, producing a vast number of pieces, of which a few are a statue of "Abel;" Byron's "Medora;" "Genius of America;" a statue of "Washington;" the "Angel Abdiel;" the "Graces;" "Savior Crucified;" and busts of John and John Quincy Adams, Henry Clay, Josiah Quincy, Samuel Appleton, Jonathan Mason,

Thomas Colen, John Jacob Astor, John Marshall, and others. The large group of "The Rescue" in the capitol took eight years of his time. It had been brought by him from Italy, and he was preparing to set it in its place, when he died suddenly of brain fever. He was the author of several essays on esthetics, and was perhaps more eminent as a critic of art than as an artist. His work has doubtless been surpassed by that of later sculptors, but he may fairly be called the father of American sculpture.

GREENOUGH, RICHARD S., brother of Horatio, and also a sculptor, b. Mass., 1819. He had the advantage of study under Clevinger, and in 1840–41, was among the artists and galleries of Europe. Some of his works are a "Head of Christ;" "Moses and Pharaoh's Daughter;" "Night Watching a Young Mother;" "Cupid Warming an Icicle;" "The Shepherd Boy and the Eagle;" "Victory;" with various busts and ideal heads.

GREENPOINT. See BROOKLYN.

GREENPORT, a t. in Suffolk co., N. Y., on the n. shore and near the e. end of Long Island, at the terminus of the Long Island railroad, 95 m. e.n.e. of New York. It is a port of entry and was once the starting point of an important whale-fishing business. There is still considerable local business and trade by sea. The town and neighborhood are much frequented by summer pleasure-seekers.

GREEN RIVER, a river of North America, and tributary of the Ohio, rises near the center of the state of Kentucky, and flows through it; first in a westward direction for about 150 m., passing the Mammoth cave, then north-westward for the remainder of its course. It joins the Ohio 9 m. above Evansville, in Indiana, and at its mouth is about 600 ft. in breadth. It is upwards of 300 m. in length, and is navigable for small steamers for 200 miles. The lower course of the Green river abounds in coal.

GREEN RIVER, the name of two considerable streams in Massachusetts; one comes from Windham co., Vt., and falls into Deerfield river at Greenfield. The other, starting from the boundaries of Massachusetts and New York, runs s. through West Stockbridge, Alford, Great Barrington, etc., to the Housatonic. Both streams afford valuable water-power.

GREEN RIVER, rising in Wyoming, flows s. through about two thirds of Utah; unites with Grand river and forms the great Colorado. The Green is 750 to 800 m. long, and runs through many deep gorges and cañons in a mountainous region, and is for the most part too rough or shallow for navigation.

GREENS, the common name of all those varieties of kale or cabbage (*brassica oleracea*) which do not boll, and of which the leaves are used for the table as boiled vegetables; some of which are also called colewort, etc., whilst others, particularly those with curled leaves, as German greens, have no other name than greens or kale. Young unbolled cabbages, and shoots from the stocks of cabbages, are often also called greens, as well as turnip-tops, and other leaves of plants used in the same manner.—The leaves of GERMAN GREENS are very much waved or curled. It is one of the best kinds of *open* greens. It is either sown in spring, and planted out soon after; or it is sown in autumn, and planted out in spring.

GREEN'SAND, the name given to two divisions of the cretaceous measures (q.v.). They are so called from the occurrence in some of their beds of numerous small green specks of silicate of iron, sometimes so abundant as to give a green color to them. The term is, however, far from being descriptive of the various included strata; it must be considered simply as a name. In some districts, especially on the continent, the green particles are entirely absent from the strata. On this account it has been proposed that the lower greensand should be called Neocomian, because strata of this period are well-developed at Neufchâtel (Neocomum), in Switzerland. The mineral structure or lithological character of the upper greensand is so like that of the lower, that it is scarcely possible to separate them when the intermediate gault is absent, except by their organic remains, which are very distinct; so much so, indeed, as to have caused the placing of the one series in the lower cretaceous group, and the other in the upper. It should also be noticed that the relative importance of the two divisions is very different; the lower greensand includes a series of strata that are of a value nearly equal to the whole upper cretaceous group, of which the upper greensand is but a subordinate member.

The *upper greensand* consists of beds of sand, generally of a green color, with beds and concretionary masses of calcareous grit, called firestone. The strata on the cliffs of the isle of Wight are 100 ft. in thickness. This formation is supposed to have been a littoral deposit on the shore of the cretaceous seas. While the chalk was being deposited out at sea, these sands were being laid down along the shore, contemporaneous with the chalk, although they appear inferior to it. Their position would necessarily result from the cretaceous sea widening its area, and as the shore submerged, the greensand would be covered with the chalk, and would appear as an older and underlying deposit. The beds of this period are rich in fossils, abounding especially in the remains of sponges, mollusca, and echinodermata.

The *lower greensand* consists of a large series of more or less indurated sandstones and clays, with occasional calcareous beds. They attain a thickness of 850 feet. The sands preponderate in the upper, and the clays in the lower portion of the formation.

Some beds of clay of considerable thickness, sometimes as much as 60 ft., are used as fullers' earth. The calcareous stone is a highly fossiliferous band of limestone, locally called Kentish rag, much used for building in Kent and Sussex. The formation was formerly known as the iron sand, because of the sands being cemented together by an abundance of oxide of iron; this gives them a reddish color. The lower greensand contains numerous fossil mollusca and other marine remains. It is a sea deposit resting on the fresh-water wealden strata, and showing that at this period the sea made considerable encroachments on the dry land.

GREENSBORO, the seat of justice of Hale co., Ala., on the Selma, Marion, and Memphis railroad, 5 m. n.w. of Selma: pop. '70, 1760. The village is the seat of the Southern university of the M. E. church (founded in 1859), and has a female seminary and other schools.

GREENSBURG, the seat of justice of Decatur co., Ind., on the Indianapolis, Cincinnati, and Lafayette railroad, 68 m. w.n.w. of Cincinnati; population estimated at 3,700. The place has a considerable number of manufactories, a court-house, and high school.

GREENSHANK, *Totanus glottis*, a bird of the same genus with the redshank and some of those known as sandpipers, but differing from them in the stronger and slightly recurved bill. It is about the size of a woodcock, but has much longer legs. The bill is about 2 in. long. The tail is short. The lower part of the tibiæ is naked. The plumage is mostly dusky brown on the upper parts, the feathers edged with yellowish white; the under parts are white. Small flocks of this bird are seen on the British coasts in the winter months, and sometimes near inland lakes and marshes. A few remain to breed in the Hebrides and n. of Scotland, but the greater number repair to more northern regions. The geographic distribution of the species is extremely wide even for a bird of passage; from the arctic parts of Europe, Asia, and America, it extends southward as far as Java and Jamaica.

GREEN SNAKE, a serpent common through most of the United States, especially in grassy places; long, slender, and entirely harmless.

GREENSTONE, a variety of trap rock (q.v.), composed of feldspar and hornblende, and having generally a greenish color, hence its name. It has a more or less compact structure—the component crystals in one specimen being scarcely discernible with a pocket-lens, while in another they form a coarse aggregate, and specimens exhibiting all the intermediate stages may be found. In the finest they are not so small and compact as in basalt. Its crystalline structure separates greenstone equally from the earthy tufts and the glassy pitchstones. It may become porphyritic from a portion of the feldspar forming into larger distinct crystals. In weathering, the disintegrating greenstone assumes a dark-brown color, and exfoliates round limited centers, giving the rock an appearance as if it were composed of a number of large bowlders.

GREENUP, a co. in n.e. Kentucky, on the Ohio river, crossed by the Eastern Kentucky railroad; 480 sq.m.; pop. '70, 11,463—461 colored. The surface is hilly. Chief productions, corn, wheat, and oats. Co. seat, Greenup.

GREENVILLE, a co. in n. South Carolina, on the North Carolina border, n.e. of Saluda river, intersected by the Atlantic and Richmond railroad; 800 sq.m.; pop. '80, 37,494—14,511 colored. The surface is diversified by mountains, hills, and valleys, and much of it is yet forest land. Wheat, corn, and pork are the main products. Co. seat, Greenville Court House.

GREENVILLE, a co. in s.e. Virginia on the North Carolina border s. of Nottaway river; crossed by the Petersburg and Weldon railroad; 300 sq.m.; pop. '70, 6,362—4,207 colored. The surface is level and largely covered with forests. Corn, oats, and tobacco are the main products. Co. seat, Hicksford.

GREENVILLE, the seat of justice of Butler co., Ala., on the Mobile and Montgomery railroad, 34 m. n.n.e. of Mobile; pop. '70, 2,856. The village has a court-house, several churches, and some manufactures.

GREENVILLE, the seat of justice of Darke co., Ohio, on the Dayton and Union railroad at the junction of the Columbus, Chicago and Indiana Central, 94 m. w. of Columbus; pop. 2,520.

GREENVILLE, or GREENVILLE COURT-HOUSE, the seat of justice of Greenville co., S. C., on the Atlanta and Richmond, at the terminus of the Greenville and Columbia railroad; pop. '80, 6,159. It is pleasantly situated, and is the seat of the southern Baptist theological seminary, and of the Farman university, also Baptist. There are some manufactories.

GREEN VITRIOL, a popular name for sulphate of iron. It sometimes occurs as an efflorescence resulting from a chemical change in *iron pyrites* or sulphuret of iron, but its quantity is generally small. It crystallizes in acute oblique rhombic prisms.

GREENWEED, a name given to certain half-shrubby species of *genista*. See GENISTA and BROOM.—DYERS' G. (*G. tinctoria*), a species about one or two feet high, with lanceolate leaves, and terminal spiked racemes of pale-yellow flowers, is frequent in woods,

meadows, and hilly pastures in most parts of Europe, and in the temperate parts of Asia; and is common in many parts of England, but rare in Scotland and Ireland. Its branches, leaves, and flowers—particularly the flowers—yield a fine yellow dye, chiefly used for wool; its flowers mixed with woad yield a fine green dye. It was formerly in great esteem as a dye-stuff, but others have now almost entirely supplanted it. The leaves and seeds were also formerly used in medicine; the former as a diuretic, the latter as a mild purgative.—HAIRY G. (*G. pilosa*), a rare native of Britain, but abundant in some parts of Europe, is cultivated in some places, especially in France, as food for sheep, which are very fond of it. It is particularly adapted for light and sandy soils. It is a slender, branched, tortuous, and procumbent plant, with small pale-yellow flowers.

GREENWICH, a t. in Fairfield co., Conn., on Long Island sound, and the New York and New Haven railroad, 30 m. n.e. of New York, near the boundary of New York state. It is a handsome village and a favorite place of residence for business men of the metropolis. The place was settled about 1640, and ten years later was agreed upon by a Dutch and English commission as the w. boundary of Connecticut. The present village is on a rolling hill half a mile from the railway station. A short walk to the e. brings one to a stately Congregational church built of gray marble with high pointed roof and a fine stone spire visible for many miles along the sound. A few yards to the e., where a church stood in 1779, gen. Putnam with 60 raw militiamen fought to the last moment a large force of English dragoons, and then galloped his horse down a declivity where no enemy dared to follow. Most of his men escaped by hiding in a swamp.

GREENWICH, a parliamentary borough of England, in the co. of Kent, is situated on the right bank of the Thames, at a distance of 5 m. s.e. of London. It stands partly on an acclivity, but for the most part on low marshy ground, portions of which are said to be below the level of the Thames. The older streets are in general narrow and irregular, but those more recently built are spacious and handsome. By far the most interesting institution in Greenwich is the hospital. See GREENWICH HOSPITAL. Among the other more important buildings are the Norfolk college, which supports 22 poor inmates and a warden, and of which the Mercers' company are the trustees; and the royal observatory (see OBSERVATORIES), situated in the midst of Greenwich park, a finely-kept extent of public grounds comprising nearly 200 acres. Greenwich abounds in taverns, and is always a favorite resort of Londoners, but especially so in the "whitebait" season—from April to Aug. The town contains extensive engineering establishments, iron steamboat-yards, rope-works, and several factories. Greenwich, which is also connected with London by railway, is touched at by all the river steamers. Pop. '71, 169,361.

GREENWICH HOSPITAL, formerly a home for superannuated sailors, was a royal foundation, erected by the munificence of William and Mary, under their letters patent of 1694. For many generations a royal palace had occupied the site, and had always been a favorite resort of the sovereign. The buildings were sufficiently completed by 1705 (at a cost of £50,000) to admit 100 disabled seamen. By July 1, 1708, 350 had been admitted; and the income derived from bequests, the original royal grant, and from contributions made under coercion by sailors, amounted to £12,000 a year, half of which was expended in maintaining the seamen, and the remainder in completion of the building. In the reign of George II., the forfeited estates of the earl of Derwentwater, who had been attainted of high treason, were granted to the hospital, were granted to the hospital, and were computed at £6,000 a year. Up to 1834 a compulsory contribution of 6*d.* a month was exacted from all seamen, whether of the navy or merchant service, towards the funds of the hospital; but in that year an annual grant of £20,000 from the consolidated fund was substituted.

The income from all sources afterwards reached nearly £150,000 a year, out of which the following officers and pensioners were maintained: 1 governor, £1500 per annum; lieutenant-governor, £800; 4 captains, 4 commanders, 8 lieutenants, 2 masters, 2 chaplains, a considerable staff of naval medical officers and nurses, and 1600 pensioners. The pensioners were lodged, clothed, and fed at the expense of the hospital, and in addition had the following pecuniary allowance as tobacco and pocket-money: warrant-officers, 5*s.* a week; petty-officers, 4*s.*; seamen, 3*s.* The nurses were usually the widows of sailors who had lost their lives in the service.

The question had been frequently raised of late years, whether this superb charity was not, after all, a mistake, and whether the vast revenues would not be bestowed to better advantage in pensions to seamen, who might still find employment in aid of their subsistence, and who would have the happiness of passing the last days of their lives among their descendants and relatives. Under the old rules, the hospital was, so far as the pensioners were concerned, a monastery in which hundreds of men lived together, without any of the soul-sustaining inducements of monasticism. The old men were, on the whole, painful objects to contemplate, wrecks from whom no further good of any description was to be expected. Leading lives useless to themselves and to others, their best occupation was to recount, with the garrulity of age and the boastfulness of self-absorption, the exploits of long ago. Many would have preferred to see them in happy country-homes, kept by pensions from absolute want, teaching their grandchildren to

delight in the country's glory, and spreading throughout the land, instead of concentrating in one parish, a knowledge of how England can provide in their old age for those among her sons who serve her faithfully in their prime.

The authorities were convinced at last that this semi-monastic inclosed life was not good for the old salts, who much preferred being with their children and friends in country villages or at seaports. Accordingly, in 1865, by the 28 and 29 Vict. c. 89, the institution ceased to exist as an asylum for aged sailors. The funds were converted into *out*-pensions, providing for a larger number than were maintained in the hospital; the old men were relegated to their friends; and the truly noble buildings, after lying vacant for some five years, became a royal naval college for officers to acquire naval science.

Attached to the hospital is a school for the gratuitous education of 800 sons of seamen. This establishment is under the superintendence of the same commissioners as the hospital, and with regard to funds, is consolidated with it. The education given is such as to fit the recipients for service in the royal or merchant navy; and the period during which boys are permitted to participate in its advantages extends to from three to four years.

In addition to the in-pensioners alluded to above, about 12,000 old or disabled seamen were assisted in their old age by what was called the *Greenwich out-pension*. This, however, is now styled a *naval pension*. It varies from £3 to £57 a year. These men, distributed throughout the country, receive their pensions from the staff-officers of military pensioners, in their respective districts.

The buildings of Greenwich hospital and schools occupy the whole space, with the exception of a roadway, between the Thames and Greenwich park; and taken together, they constitute a magnificent series of buildings, those composing the hospital being among the finest in the whole kingdom.

GREENWICH OBSERVATORY. See OBSERVATORY.

GREENWOOD, a co. in s.e. Kansas, on the headwaters of Verdigris river; 1155 sq.m.; pop. '70, 3,484. The surface is generally level; productions agricultural. Co. seat, Eureka.

GREENWOOD, FRANCIS WILLIAM PITT, 1797–1843; b. Boston, graduated at Harvard, studied theology, and became prominent among those known as liberal Christians. For a year he was pastor of the new South church, Boston, but resigned in consequence of poor health. He was afterwards pastor of King's chapel. Among his literary labors were editing the *Unitarian Miscellany*, revising the *Book of Common Prayer*, *Sermons of Consolation*, *History of King's Chapel*, *Lives of the Twelve Apostles*, *Sermons to Children*, and many smaller publications.

GREENWOOD CEMETERY. See CEMETERIES.

GREER, a co. in the n.w. corner of Texas, according to the state claim, lying between the forks of the Red river; but considered by U. S. surveyors as lying within the Indian territory; area 3,480 sq. miles. It contains good land, but little timber. It is unsettled, and as yet unorganized.

GREG, WILLIAM RATHBONE, b. England 1809. In 1856 he was commissioner of customs. He has published *Essays on Political and Social Science; Enigmas of Life; Literary and Social Judgments; Political Problems; Creeds of Christendom; Rocks Ahead, or the Warnings of Cassandra; Mistaken Aims and Attainments of the Artisan Class*, and many short papers in the British journals. He is a trenchant writer, with a strong skeptical habit of thought.

GREGARINES (GREGARINIDÆ *ante*), animals which form the principal genus (*Gregarina*), of the family *gregarinidæ* of that branch of the animal kingdom called *protozoa*. The principal form is an oval sac without mouth or intestines, but filled with a granular matter. They are sometimes of considerable length, said to be owing to linear aggregation for purposes of reproduction. Whatever fructification is the result of this intercourse is cast forth by the bursting of the cell in the form of vesicles called pseudo-navicula, which, by the process of alternate generation, produce pseudo-amœbæ, these latter passing on into the condition of developed gregarines, to pass again through the different stages of the simple metamorphosis. One of the largest inhabits the intestines of the lobster, and is called *G. gigantea*, being nearly two-thirds of an inch long and nearly as wide. The gregarina infest the intestines of various articulates, as the lobster, crab, cockroach and various beetles. A small insect which infests the false hair which fashion often prescribes as a part of the head dress of women, has also been called a gregarine.

GREGARI'NIDÆ. This term was applied by Leon Dufour to designate a group of microscopic organisms belonging to the sub-kingdom *protozoa*, which have been discovered as parasites in the intestinal canal in various invertebrate animals, especially insects, araehnidans and certain chætopodous worms. They seem to have been first observed by Cavolini in the last century, but the earliest systematic notice of them is that of Dufour in 1828, who gave them their name from the groups in which they occurred.

The form of the body varies: it may be cylindrical, ovate, fusiform, or threadlike.

It is often marked by indentations or strictures corresponding to the spot where an internal septum divides the organism into two or more segments. In some, a process projects from one end of the body, or there may be two lateral processes, and to these prolongations minute hooks are attached by which it is supposed that these animals attach themselves to the surfaces on which they are generally found. Anatomically, the gregarinidæ consist of an extensible transparent membrane inclosing a granular mass, in which we observe a nucleus surrounded by a clear space. See CELLS. These organisms are colorless; their locomotive powers seem very limited; and they have neither mouth nor feet.

On carefully watching them under the microscope, we observe two of them to come in contact. The surfaces in contact become flattened, and a cyst or capsule soon forms around them and incloses them. Numerous globular vesicles are then produced in the interior, and these become ultimately metamorphosed into peculiar bodies, which are termed *pseudo-naviculæ*. The septum by which the two gregarinidæ were at first divided, finally disappears; the cysts bursts, and the pseudo-naviculæ escape, and in due time bursts also; and thus gives rise to bodies closely resembling amœbæ, minute animals belonging to the rhizopoda (q.v.), which at length develop themselves into young gregarinidæ. The coalescence or conjugation of the gregarinidæ is not positively essential to the formation of pseudo-naviculæ, since they are sometimes seen to occur within the bodies of single animals.

We have followed, as we believe, the best authorities in placing the gregarinidæ as adult forms of the group of the protozoa. There is, however, considerable difference of opinion regarding the position they ought to occupy. Stein places them among the infusoria, Leon Dufour, Leidig, Vogt, and others, place them under various divisions of the worms, while some have even held that they are vegetable forms.

It is exceedingly probable that certain minute parasitic organisms, occurring both on and within the bodies of fishes, and to which the term *psorospermiæ* has been applied, are identical with the pseudo-naviculæ, which we have already described.

The gregarinidæ have been divided into (1) the *monocystidæ*, when the animals are solitary; and (2) the *Zygocystidæ*, when two animals are conjoined.

Numerous memoirs have been written on the gregarinidæ. We may especially refer to Kölliker's memoir in the *Zeitsch. f. wissen. Zoologie* (1848), and the Lieberkühn's memoir on their development in the *Memoires Couronnés des Savants Etrang.*, published by the Brussels royal academy in 1855.

GREGG, a co. in n.e. Texas, on Sabine river, and the Texas and Pacific railroad; formed after the census of 1870. The surface is varied; chief productions corn and cotton. Co. seat, Longview.

GREGG, DAVID MCM., b. Penn., 1833; graduated at West Point, and served chiefly on the western borders. In the war of the rebellion he served on the union side, and was in a number of engagements. He resigned two months before the close of the war, holding the rank of brevet maj.gen. of volunteers.

GREGG, JOHN I., b. Penn., went into the army and served in the Mexican war. He served also in the war of the rebellion, and was engaged at Gettysburg, Cold Harbor, and other places. For good conduct he was made brevet brig.gen. in the regular army, and in 1866 was appointed col. of the 8th cavalry.

GREGOIRE, HENRI, the most remarkable among the so-called "constitutional" bishops of France, was born of poor parents at Vebo, near Luneville, Dec. 4, 1750. Having received his education from the Jesuits at Nancy, he entered into orders, and for some time held a professorship at the Jesuit college of Point-à-Mousson. A work of his, published in 1778, on the *Amelioration of the Condition of the Jews*, attracted considerable notice. It was translated into English, and crowned by the royal society of Metz. Gregoire, soon after his ordination, was appointed curé of Embermesnil, in Lorraine; and at the election for the states-general in 1789, he was chosen one of the deputies of the clergy. An ardent democrat in all his views, he attached himself from the first to the Tiers-état party, and acted a prominent part in the subsequent drama; he was one of the chief advisers of the secession, took the oath of the Tennis court with the rest, and supported the abbé Sieyes in the proposal for constituting the seceders into the national assembly, of which he became one of the secretaries. From that time forward, Gregoire pursued his course without hesitation. He was one of the most enthusiastic on occasion of the famous session of the night of Aug. 4, in the abolition and renunciation of the privileges of the nobles and clergy. Gregoire carried into every department the stern democracy to which he was devoted, and which he identified with the Christian brotherhood of the gospel. Upon the fundamental doctrine of the revolution—the "rights of man" he sought to ingraft his own early advocacy of the Jews and of the negroes. Carrying the same views into questions of church-polity, he was a zealous supporter of the civil constitution of the clergy. was the first of his order to take the oaths, and was elected the first "constitutional bishop" of the department of Loir-et-Cher. He was chosen for two places, but accepted this, although the old and legitimate bishop, Monseigneur de Themines, was still alive. When at the blasphemous feast of reason, the miserable Gobel, constitutional bishop of Paris, having publicly renounced Christianity, a similar renunciation was demanded from Gregoire by the infuriated

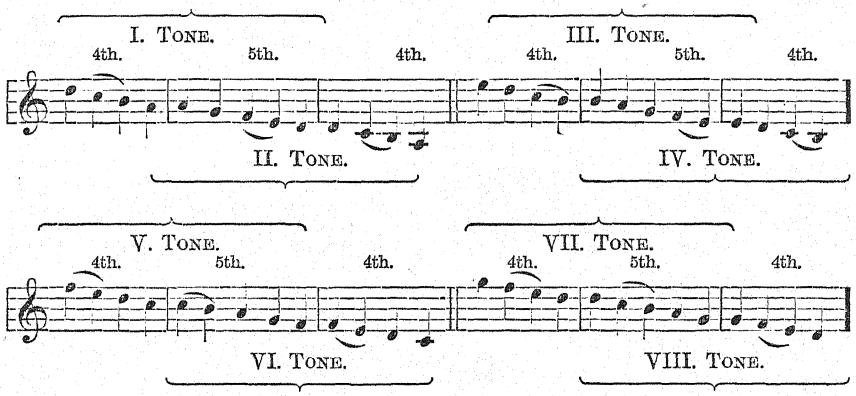
rabble, he firmly confronted the danger, and refused. Through the later phases of the revolution, under the directory, Gregoire continued to take a part in public affairs; and to his interference are due many of the measures connected with the public organization of literature and science, which still bear their fruits in the French system of administration. After the 18th Brumaire, he became a member of the corps legislatif. His extreme republicanism was highly distasteful to Bonaparte, and it was only after a third attempt that he was appointed member of the senate. On the conclusion of the concordat between Pius VII. and Bonaparte, he ceased to exercise ecclesiastical functions, as he could not be induced to give the retractations which the church authorities required. True to his old principles, he resisted every step towards the establishment of the absolute authority of Napoleon; and, in 1814, he was one of the first to pronounce against the empire. On the restoration, he was one of the most earnest in demanding from the king the acceptance of the constitution. During the "hundred days," he attracted no notice; but after the return of the king, he was excluded from the senate, and ceased thenceforth to hold any public place. During this enforced retirement, and in the intervals of leisure in his earlier political life, he published several works, literary, religious, political, historical, and polemical, the most voluminous of which are a *Chronique Religieuse*, in 6 volumes, and a *Histoire des Sectes Religieuses*, also in 6 volumes, but incomplete. When upon his death-bed, an effort was made by the archbishop of Paris to induce him to express his regret for the uncanonical and schismatical proceedings of his earlier career; but he persistently declined to make any retractation. In consequence of his refusal, the archbishop directed that the last rites of the church should be withheld. Notwithstanding this prohibition, the last sacraments were administered to Gregoire by the abbé Guillon, and he died May 23, 1831.

GREGORAS, NICEPHORAS, b. about 1295; a priest in Constantinople, who proposed a reformation in the calendar in a plan which came very near exactness. He was a theological controversialist, and was much involved in the disputes between the eastern and western branches of the church, and was in trouble about the teachings of Barlaam. He wrote a Byzantine history.

GREGO'RIAN CALENDAR AND YEAR. See CALENDAR.

GREGORIAN CHANT OR TONES, the name given to certain choral melodies introduced into the service of the early Christian church by pope Gregory the great, who flourished towards the end of the 6th century. The music of the church in earlier times was founded on the Greek system, as far as it could be used, which was improved from time to time, until St. Ambrose, bishop of Milan, in the 4th c. invented the Ambrosian chant. See AMBROSIAN CHANT. In 599 pope Gregory began to reform and improve the music of the church at Rome, by discarding the Greek tetrachord, or scale, on the basis of a fourth, and in its place substituting the scale of the octave, which some writers say he named by the letters of the alphabet, while others say he had a pecular set of signs called *nota Romana*, consisting partly of words with points, strokes, and other marks, which sufficiently served his purpose. To the authentic modes of Ambrosius, Gregory added the plagal, which began with the fourth below, and thus he completed the octave. He retained the four most useful modes of the Ambrosian chant, termed the *Dorian*, *Phrygian*, *Lydian*, and *Mixolydian*, which are supposed to have been obtained from the ancient Greeks. At first Gregory's improvement was called the *Roman chant*, but later it got the name of *cantum planum* or *firmum*, as it was originally sung in unison, and in notes all of the same length. At a later period the letters of the Roman, as well as of the Greek alphabet, were used to express the notes of the Gregorian chant, but without any general fixed order or rule. In the course of time, the system of notation on lines and spaces came into use; but at first only four lines were used, on which we find all the old examples of the Gregorian chant written. By the Gregorian tones, or modes (*toni*, *modi*) of Gregory, must be understood in certain melodious formula, made out of the union of a perfect fifth and a perfect fourth, or their inversion, to give the church-song greater variety. All the old writers agree as to the diatonic genus of the Gregorian tones, but they do not all agree as to the number of the tones; some counting fourteen, others twelve, while in some old Roman choral-books we find only eleven. The foundation of the system of the Gregorian tones may be explained thus: As there are seven notes from *a* to *g*, there should be at least seven different modes, or tone-systems, varying from each other according to the position of the semitones; but as the final or key-note of each mode might be the first note, or might be in the middle, the same scale could therefore, as it were, be viewed from two sides, which gave rise to the fourteen system of tones. It was, however, found that two of those were at variance with a fundamental rule of church-song—viz., that every mode or scale must possess a perfect fifth or perfect fourth; and that the modes containing a false fifth from *b* natural to *f* natural, or a false fourth from *f* to *b*, could not be used, and on account of the dissonant character of these intervals must be rejected. This reduced the number of tones to twelve. It was further found, that as four of the twelve were merely transpositions of some of the others, there were really only eight, and that they were in every respect sufficient for all the purposes of church-song. The eight Gregorian tones, as they are handed down to us, were in time fixed by a royal mandate of Charles the great—*octo*

toni sufficere videntur. The following example in modern notation in the G clef will show the position of the eight Gregorian tones:



There cannot be little doubt that pope Gregory greatly improved the church-music at the time, and that the eight tones have always been ascribed to him. That they are of great antiquity is certain, for we find them mentioned in a treatise on choral singing by one Aurelian in the 9th century. The different character of the Gregorian tones depends entirely on the places of the semitones, which in the above example are marked with a ⌒. Several of the tones have various endings, some as many as four, while the second, fifth, and sixth tones have each only one ending. For a full and interesting account of the Gregorian church-music, see N. A. Janssen's *Grundregeln des Gregorianschen Kirchengesanges*, published by Schott in Mainz, 1846.

GREGOROVIUS, Ferdinand, b. Prussia 1821; educated at Konigsberg, and devoted himself to poetry and history. He has published a learned review of Goethe's *Wihelm Meister; Death of Tiberius* (a tragedy), etc. After sojourning in Italy he published *Corsica; Life and Scenery in Italy; The Latin Summer*, and *Sicily*. His more important works are *History of Rome in the Middle Ages*, and *History of Lucretia Borgia*.

GREGORY, a co. in n. Dakotah bordering on Nebraska and bounded in part by the Missouri river, formed since the census of 1870; about 1150 sq. miles. Surface for the most part level.

GREGORY, the name of a Scotch family remarkably distinguished, like that of the Bernouillis, in the history of science. Its history goes back to the union in marriage of the rev. John Gregory, minister of Drumoak, Aberdeenshire, to a daughter of a David Anderson, who is described by Dr. Hutton in his *Philosophical and Mathematical Dictionary*, as "of Finzaugh, a gentleman who possessed a singular turn for mathematical and mechanical knowledge." The most distinguished offspring of this marriage was:

James Gregory, b. at Aberdeen in Nov., 1638 or 1639. He studied at Marischal college, after leaving which, he betook himself to optical science, in which he made his first discoveries. At the age of 24, he invented the reflecting-telescope known by his name, and which he described in a work, entitled *Optica Promota*. In 1664 or 1665, he went to London with a view to the construction of his telescope; but finding the artists he employed wanting in the skill necessary for grinding the metal for the object-speculum, he passed on to the university of Padua, where he devoted himself to study; and in the year 1667, produced his *Vera circuli et Hyperbolæ Quadratura*, followed, in 1668, by two other works, *Geometriæ Pars Universalis*, and *Exercitationes Geometricæ*. These works led him into correspondence with the greatest mathematicians of the age—Newton, Huyghens, Wallis, etc. He was immediately, on his return to London, elected a fellow of the royal society, and in 1669 he obtained the professorship of mathematics at St. Andrews, a chair which he filled for about six years. Here, in 1672, he produced *The Great and New Art of Weighing Vanity*, etc., which bore to be the work of M. Patrick Mathers, archbeadle to the university of St. Andrews, the object of which was to expose the ignorance of a prof. Sinclair of Glasgow, who had put a slight on one of the St. Andrews professors. In 1674 Gregory, who had in the meanwhile married Mary, daughter of Mr. George Jamieson, a distinguished painter, was called to Edinburgh to fill the mathematical chair, which he did for little more than a year. In Oct., 1675, when showing the satellites of Jupiter to some of his pupils, he was struck with total blindness,and a few days after died at the age of 36. For a particular list and account of his works and discoveries, see Hutton's *Philosophical and Mathematical Dictionary*. Dr. Hutton describes him as a man of very acute and penetrating genius, possessing an inventive mathematical genius of the first order; somewhat irritable in temper; but exhibiting one of the most amiable characters of a true philosopher—that of being content with his fortune.

By his marriage with Mary Jamieson, James Gregory had a son of the same name, JAMES GREGORY, M.D., born in 1674, who became professor of medicine in King's college, Aberdeen, where he founded the school of medicine. This James Gregory had two sons, JAMES GREGORY, M.D. (the second), who succeeded his father in the Aberdeen professorship; and JOHN GREGORY, M.D., who merits particular notice. He was born at Aberdeen in 1724, where he received his early education; afterwards he studied medicine at Edinburgh, Leyden, and Paris. After filling in succession the chairs of philosophy and medicine at Aberdeen, he was appointed, in 1766, professor of the practice of medicine in Edinburgh, where he long enjoyed high reputation as a teacher and practicing physician, along with the greatest personal popularity. He was the intimate friend of the most eminent men of Edinburgh in its most brilliant period. He died Feb. 9, 1773. Among his works are—*Elements of the Practice of Physic*, 1772; *A Comparative View of the State and Faculties of Man with those of the Animal World*, 1765; and *A Father's Legacy to his Daughters* (published after his death), 1793. In 1788 his works were collected in 4 vols. 12mo, by Mr. Tytler (lord Woodhouselee), who prefaced them by a life of the author. A life of him was also written by Mr. Smellie. His son, Dr. JAMES GREGORY (the third), became distinguished as professor of the practice of medicine at Edinburgh, and a leading man in his profession. He was the author of *Philosophical and Literary Essays*, 2 vols. 8vo, Edin. 1792. The son of this Dr. James was the late WILLIAM GREGORY, professor, at one time, of chemistry in King's college, Aberdeen, and who died April, 1858, as professor of chemistry in the university of Edinburgh. William Gregory was well known by his works on chemistry, and his edition of the inorganic part of Turner's *Elements of Chemistry;* the organic part of which was edited by Liebig. He also translated, 1855, Liebig's *Principles of Agricultural Chemistry.* Amongst his contributions to chemistry may be noticed his improved processes for the preparation of hydrochloric acid, muriate of morphia, and oxide of silver, and his memoirs on the preparation of sulphuric acid, on the preparation of creatine, on the decomposition products of uric acid, on the spontaneous decomposition of alloxan, on the purification of chloroform, etc.

We have now to revert to the original stock—the family of the rev. John Gregory and Jane Anderson. James Gregory, inventor of the telescope, and founder of the line of distinguished men which we have just followed, had an elder brother of the name of DAVID—a remarkable man, skilled in medicine, philosophy, and mathematics, and known as DAVID GREGORY of Kinardie—the first man in Scotland who kept a barometer, a circumstance which, according to Dr. Hutton, nearly led to his being tried by presbytery as a wizard. This David had three sons, named respectively, DAVID, JAMES, and CHARLES. The first of these became Savilian professor of astronomy, Oxford. He was born at Aberdeen in 1661, and there received the early part of his education, which was completed at Edinburgh. He is supposed to have been disposed to mathematical studies, by having been appointed literary executor of his uncle James—of the telescope—more likely it is that he was so appointed because he had already manifested an aptitude for such studies. With the executry, at any rate, his uncle's "mantle" descended upon him. In his 22d year he was appointed professor of mathematics in the university of Edinburgh, and by his lectures in this chair, he had the honor of being the first to introduce the Newtonian philosophy into the schools. In 1691, through the friendship of Newton and Flamsteed, he obtained the vacant Savilian professorship of astronomy at Oxford, for which the illustrious Halley was a competitor. Halley, however, soon after abtained the professorship of geometry in the same university, and became a great friend and fellow-worker of Gregory's. Dr. David died at Maidenhead in 1710, in his 49th year.

Among the works of Dr. David Gregory may be mentioned, *Exercitatio Geometrica de Dimensione Figurarum* (Edin. 1684); *Catoptricæ et Dioptricæ Sphæricæ Elementa* (Oxford, 1695), which contained the substance of his Edinburgh lectures, and in which, among other ingenious matters, Dr. Hutton thinks there is an anticipation of Dolland's achromatic telescope. *Astronomiæ Physicæ et Geometricæ Elementa*, Oxford, 1792. An edition of Euclid in Greek and Latin, which is highly valued, 1703. Towards the end of his life he worked with Dr. Halley on an edition of the *Conics of Apollonius*, but did not live to see it finished. He was the first who considered the Catenary, on which he left a paper in MS., besides a short treatise on the *Nature and Arithmetic of Logarithms;* a treatise on *Practical Geometry*, published in 1745 by Maclaurin; and many memoirs which were published in the *Phil. Trans.*, vols. xviii.—xxv. Of his four sons, the eldest, David Gregory, became regius professor of modern history at Oxford, and dean of Christ's church. On Dr. David Gregory removing to Oxford, he was succeeded, in 1691, in the Edinburgh chair, by his brother James, who filled it for 33 years, when he retired, and gave place, in 1725, to Maclaurin. His brother Charles, in 1707, became professor of mathematics at St. Andrews, an office which he held for 32 years, when he resigned it, and was succeeded by his son, another DAVID, who died 1763.—The three sons of David of Kinardie were thus, at the same time, professors of mathematics in three universities, while two of them left sons who obtained professorships. Dr. Thomas Reid of Glasgow, it may be mentioned, was a nephew, through his mother, of these illustrious brothers. Altogether, it is said (Chalmer's *Biographical Dictionary*, p. 289) that no less than 16 members of this family have held British professorships.—Mention

must be made, in conclusion, of R. F. GREGORY, late fellow of Trinity college, Cambridge, author of *Examples in Differential and Integral Calculus*, and other valuable works, who died before bearing the full fruits of his genius, and who is understood to have belonged to the family of the Scottish Gregories.

GREGORY, the name of sixteen popes, of whom the most important, historically, are treated in separate articles.

GREGORY I., THE GREAT, a father and saint of the Roman Catholic church, was born in Rome about the middle of the 6th c. of an illustrious Roman family. His father, Gordianus, was a senator, and one of the earlier pontiffs; Felix III. had belonged to the same family. At a comparatively early age Gregory was named by the emperor Justin II. to the important charge of prætor of Rome; but he voluntarily relinquished this office, and withdrew altogether from the world into the monastery which he had founded in Rome, under the title of St. Andrew's. This was but one of many such acts of religious munificence. "He founded and endowed," says Dean Milman, "six monasteries in Sicily." Before entering the Roman convent, equally founded by himself, which he chose for his own retreat, "he lavished on the poor all his costly robes, his silk, his gold, his jewels, his furniture, and not even assuming to himself the abbacy of his convent, but beginning with the lowest monastic duties, he devoted himself altogether to God." This was probably about 575. He was elected abbot of his monastery, and it was while he was still in this office that the well-known incident befell of his meeting the Anglo-Saxon youths in the slave-market, and on being struck by their beauty, and learning that they came from a pagan land, resolving to devote himself to the conversion of that land to Christianity. He set forth on his journey, but the clamor of the Romans at his loss led the pope Benedict to compel his return, and eventually to enroll him in the secular ministry by ordaining him one of the seven regionary deacons of Rome. Benedict's successor, Pelagius II., sent Gregory as nuncio to Constantinople, to implore the emperor's aid against the Lombards. He resided three years in Constantinople, during which time he commenced, and perhaps completed, his great work, the *Exposition of Job*. On his return to Rome he resumed his place as abbot, and on the death of Pelagius, in a plague which laid waste the city, Gregory was unanimously called by the clergy, the senate, and the people to succeed him. He used every means even to a petition to the emperor Maurice to withhold his consent, to evade the dignity; but he was forced to yield, and was consecrated Sept. 3, 590. Few pontiffs have equaled, hardly one has surpassed, Gregory as the administrator of the multiplied concerns of the vast charge thus assigned to him. "Nothing," says Dean Milman, "seems too great, nothing too insignificant for his earnest personal solicitude; from the most minute point in the ritual, or regulations about the papal farms in Sicily, he passes to the conversion of Britain, the extirpation of simony among the clergy of Gaul, negotiations with the armed conquerors of Italy, the revolutions of the eastern empire, the title of universal bishop usurped by John of Constantinople" (*Latin Christianity*, i. 439). There is no department of ecclesiastical administration in which he has not left marks of his energy and his greatness. To him the Roman church is indebted for the complete and consistent organization of her public services and the details of her ritual, for the regulation and systematization of her sacred chants. The mission to England, which he was not permitted to undertake in person, was intrusted by him, with all the zeal of a personal obligation, to Augustine; and, under his auspices, Britain was brought within the pale of Christian Europe. Under him the Gothic kingdom of Spain, long Arian, was united to the church. Nor was his zeal for the reformation of the clergy, and in purifying of the morality of the church, inferior to his ardor for its diffusion. His letters, which are numerous and most interesting, are full of evidences of the universality of his vigilance. On occasion of the threatened invasion of Rome by the Lombards, Gregory is declared by Milman to have "exercised the real power by performing the protecting part of a sovereign;" and in his general administration, to have been "in act and in influence, if not as yet in avowed authority, a temporal sovereign." Against the memory of his administration of Rome a charge was formerly made, that in his zeal against paganism he destroyed the ancient temples and other buildings of the pagan city; but Gibbon confesses that the evidence "is recent and uncertain;" and, indeed, the only authority to which Gibbon himself refers, Platina, simply mentions the charge in order to repudiate it. The same, according to Milman, may be said of "the fable of his having burned the Palatine library in his hatred of pagan literature, which is now rejected." As regards the general government of the church, Gregory reprobates very strongly the assumption by John, patriarch of Constantinople, of the title of ecumenical or universal bishop; the more especially, as the object of John in assuming this title was to justify an exercise of jurisdiction outside of the limits of his own patriarchate. In his writings, too, the details of the whole dogmatical system of the modern church are very fully developed. His works fill four folio volumes. His *Letters*, and, still more, his *Dialogues*, abound with miraculous and legendary narratives, which, however uncritical in their character, are most interesting as illustrating the manners and habits of thought of that age. Gregory, with all his zeal for the diffusion of Christianity, was most gentle in his treatment of heathens and Jews, and he used all his efforts to repress slave-dealing, and to mitigate the severity of slavery. He died March 12, 604.

GREGORY II., by birth a Roman, was elected bishop of that see in 715. His pontificate is specially noticeable as forming an epoch in the progress of the territorial pre-eminence of the Roman see in Italy. The Eastern emperors having almost utterly abandoned the government, and, still more, the defense of Italy, and the aggressions of the Lombards becoming every year more formidable, the imperial authority in the west sunk into little more than a name; and the tyrannical and barbarous measures by which the emperor Leo, the Isaurian, attempted to enforce his degrees against image-worship, weakened still more the tie which bound Italy to the eastern emperors. The natural result of the diminution of the imperial authority in Italy was the growth of that of the pope, to whom the deserted Italian provinces looked, partly as their spiritual counselor and head, partly as their mediator with the barbarous enemy, partly as the center of the political federation for self-defense which their very isolation necessitated. Gregory convened a council in Rome on the subject of the honor due to images, and addressed a very energetic letter to the emperor, protesting against the sacrilegous outrages of which he had been guilty, explaining and defending the Catholic doctrine on image-worship, and warning the emperor that the feelings of his subjects were so completely alienated by his conduct, that it was only the pope's influence which prevented them from throwing off all allegiance. Gregory has been accused of himself fomenting this disaffection. The contrary, however, is attested, not only by Gregory's own letters, but also by Paul the deacon, in his *History of the Lombards* (book vi. c. 39); and it is quite certain that the circumstances themselves, and the well-known character of the emperor, would sufficiently explain any degree of discontent in Italy. At all events, the result of the contest was a most notable aggrandizement of the political authority and influence of the popes in Italy. Gregory II. died in 731.

GREGORY III., a native of Syria, succeeded Gregory II. in 731. The encroachments of the Lombards in Italy during his pontificate became so formidable, that as the eastern emperors still remained powerless or indifferent to the protection of the Italian provinces, the Romans charged Gregory to send a deputation to Charles Martel soliciting his succor against the enemy, and proposing, upon that condition, to recognize him as their protector, and to confer on him the title of consul and patrician of Rome. This offer was made by the pope "in virtue of a decree of the Roman primus," and is of great historical importance in the consideration of the nature and origin of the papal power in Italy. The embassy failed, owing to the pressure of his war with the Saracens, to enlist the aid of Charles; but it was a step towards the consummation of the independence of the west. Gregory III. died in 741.

GREGORY IV., d. 844. He was a native of Rome, and was raised to the chair of St. Peter in 827. He is remembered for re-building Ostia as a defense for the mouth of the Tiber.

GREGORY V. (BRUNO), d. 999. He was a relative of the emperor Otho II., and was pope from May 996 until his death. His authority was disputed by an antipope, John XVI.

GREGORY VI., JOHN GRATIANUS, a priest in Rome, chosen pope in 1045. He resigned the next year, and a year afterwards died in the monastery of Cluny.

GREGORY VII., pre-eminently the historical representative of the temporal claims of the mediæval papacy, was b., about 1020, at Saona, a village in the southern border of Tuscany. Whether his family belonged to the burgher or the noble class, is disputed by his biographers. His family name, Hildebrand, would imply a Teutonic descent; but by birth and education, at least, he was Italian. His youth was passed at Rome, in the monastery of St. Mary on the Aventine, of which his uncle, Laurence (afterwards bishop of Amalfi), was abbot. From Rome he passed into France, where he entered the celebrated monastery of Cluny, in the schools of which he completed his education; and from the strict ascetic observances there practiced by him, he acquired those habits of austerity which distinguished his entire life. He visited the court of Henry III., and obtained by his preaching the reputation of great eloquence. On his return to Rome, he became the chaplain of Gregory VI., but after the death of that pontiff, he again withdrew to his former retreat at Cluny, from which he was only recalled by the earnest appeal of the new and zealous pope, Leo IX., whom he accompanied to Rome, in 1049. Under this active and devoted pontiff, Hildebrand exercised great influence. He now, for the first time, entered into holy orders, and was eventually created cardinal. Besides the important domestic employments which were assigned to him, he was sent as legate to the important council of Tours, in which the cause of Berengar was examined. Under all the short but important pontificates of the successors of Leo IX., who are known in history as the German popes—Victor II., Stephen IX., Benedict X., and Alexander II.—Hildebrand continued to exercise the same influence, and by inspiring into their government of the church the great principles to which his life was vowed, he prepared the way for the full development of his own theory of the papacy. He was unanimously elected at Rome, without awaiting the imperial authorization, three days after the death of Alexander II. The German bishops, who feared the strong arm of those reforms of which his name was a guarantee, endeavored to prevent the emperor Henry IV. from assenting to the election; but Henry gave his approval,

and the new pope was crowned, July 10, 1073. From the date of his election, the pontificate of Gregory was one life-long struggle for the assertion of the principles with which he believed the welfare of the church and the regeneration of society itself to be inseparably bound up. Regarding as the great evil of his time the thoroughly secularized condition of the church in a great part of Europe, and especially in Germany and northern Italy, he directed against this all his efforts. The position occupied by the higher clergy as feudal proprietors, the right of investiture with the temporalities of benefices claimed by the crown, the consequent dependence of the clergy upon the sovereign, and the temptation to simony (see SIMONY) which it involved, were, in the mind of Gregory, the cause of all the evils under which Europe was groaning; and of all these he regarded investiture (see INVESTITURE) as the fountain and the source. While, therefore, he labored by every species of enactment, by visitations, by encyclical letters, and by personal exhortations, precepts, and censures, to enforce the observance of all the details of discipline—celibacy, the residence of the clergy, the instruction of the people—and to repress simony and pluralism, it was against the fundamental abuse of investiture that his main efforts were directed. In the year after his election he prohibited this practice, under pain of excommunication both for the investor and the invested, and in the following year he actually issued that sentence against several bishops and councilors of the empire. The emperor Henry IV. (see HENRY IV.), disregarding these menaces, and taking the offending bishops under his protection, Gregory cited him to Rome, to answer for his conduct. Henry's sole reply was a haughty defiance; and in a diet at Worms, in 1076, he formally declared Gregory deposed from the pontificate. Gregory was not slow to retaliate by a sentence of excommunication; and in this sentence, unless revoked or removed by absolution in twelve months, by the law of the empire at the time, was involved the forfeiture of all civil rights, and deposition from every civil and political office. Henry's Saxon subjects appealing to this law against him he was compelled to yield, and, by a humiliating penance, to which he submitted at Canossa, in Jan., 1077, he obtained absolution from the pope in person. This submission, however, was but feigned; and on his subsequent triumph over his rival, Rudolf of Swabia, Henry resumed hostilities with the pope, and in 1080 again declared him deposed, and caused to be appointed in his place the anti-pope Guibert, archbishop of Ravenna, under the name of Clement III. After a protracted siege of three years, Henry, in the year 1084, took possession of Rome. Gregory shut himself up in the castle of St. Angelo. Just, however, as Gregory was on the point of falling into his enemy's hands, Robert Guiscard, the Norman duke of Apulia, entered the city, set Gregory free, and compelled Henry to return to Germany; but the wretched condition to which Rome was reduced obliged Gregory to withdraw first to Monte Cassino, and ultimately to Salerno, where he died, May 25, 1085. His dying words are a deeply affecting, but yet a stern and unbending profession of the faith of his whole life, and of the profound convictions under which even his enemies acknowledge him to have acted. "I have loved justice and hated iniquity; therefore I die an exile." The character of Gregory VII., and the theory of church-polity which he represents, are differently judged by the different religious schools; but his theory is confessed by all, even those who most strongly reprobate it as an excess, to have been grand in its conception, and unselfish in its object. "The theory of Augustine's city of God," says Milman, "no doubt swam before his mind, on which a new Rome was to rise, and rule the world by religion." In his conception of the constitution of Christian society, the spiritual power was the first and highest element. It was to direct, to command the temporal, and, in a certain sense, to compel its obedience; but as the theory is explained by Fenelon, by Gosselin, and other modern Catholics, the arms which it was authorized to use for the purpose of coercion were the arms of the spirit only. It could compel by penalties, but these penalties were only the censures of the church; and if, in certain circumstances, temporal forfeitures (as in the case of Henry IV.) were annexed to these censures, this, it is argued, was the result of the civil legislation of the particular country not of any general ecclesiastical law. Thus, in the case of Henry, the imperial crown was forfeited, according to the Swabian code, by the mere fact of the emperor's remaining for twelve months under excommunication without obtaining absolution from the sentence. Moreover, whatever may be said of the power in itself, or of the lengths to which it has at times extended, the occasion and the object of its exercise in the hands of Gregory were always such as to command the sympathy of the philosophical student of the history of the middle age. By his firm and unbending efforts to suppress the unchristian vices which deformed society, and to restrain the tyranny which oppressed the subject as much as it enslaved the church, he taught his age "that there was a being on earth whose special duty it was to defend the defenseless, to succor the succorless, to afford a refuge to the widow and orphan, and to be the guardian of the poor." Dean Milman sums up his history of Gregory as of one who is to be contemplated not merely with awe, but in some respects, and with some great drawbacks, as a benefactor of mankind.—See Milman's *Latin Christianity*, vol. iii.; Bowden's *Life of Gregory VII.* (1840); Voigt's *Hildebrand als Papst;* Villemain's (1872) and Langeron's (1874) lives of Gregory.

GREGORY VIII., ALBERTO DE MORA, succeeded pope Urban III., Oct. 21, 1187. Eight weeks afterwards he died.

GREGORY IX., UGOLINO, became pope in 1227, and died 1241. He had a long dispute with the emperor Frederick II., whom he twice excommunicated. The emperor marched upon the papal territories, took Ravenna, and intercepted a fleet from Genoa which was conveying a hundred church dignitaries to Rome. Gregory died before the trouble was settled, and his successor made haste to become the friend of the emperor.

GREGORY X., TEBALDO VISCONTI, 1209–76; canon, archdeacon, cardinal, and pope, Sept. 1, 1271. He held the second general council of Lyons, and was one of the last church leaders to urge crusades for the recovery of the holy land where he had once been papal legate.

GREGORY XI., PIERRE ROGER, 1329–78; the last of the French popes, having been chosen in 1370. He was the last pope to reside in Avignon, and himself removed thence to Rome. The works of Wycliffe came under his censure.

GREGORY XII., ANGELO CORARIO, 1325–1417; a Venetian, chosen pope, in 1406. He pledged himself (to the council of Constance) to abdicate the moment other contestants for the chair of St. Peter did so, and finally abdicated.

GREGORY XIII., HUGH BUONCOMPAGNO, was b. at Bologna, Jan. 7, 1502. He was educated in his native city, where he held the professorship of law for several years. Having settled at Rome, in 1539, he was distinguished by several important employments, and was one of the theologians of the council of Trent, on his return whence, he was created cardinal in 1564, and sent as legate to Spain. On the death of Pius V., Gregory was elected pope in 1572. Not one among the post-reformation pontiffs has surpassed Gregory in zeal for the promotion and improvement of education; a large proportion of the colleges in Rome were wholly or in part endowed by him; and his expenditure for educational purposes is said to have exceeded 2,000,000 Roman crowns. The most interesting event of his pontificate, in a scientific point of view, is the correction of the calendar (see CALENDAR), which was the result of long consideration, and was finally made public in 1582. A grievous imputation rests on the memory of Gregory from the fact of his having ordered a *Te Deum* in Rome on occasion of the massacre of St. Bartholomew (see ST. BARTHOLOMEW); but in justice it must be said, that this was done on the report of the French ambassador, which represented that bloody event, not as a deliberate aggression on the part of the Catholics, but simply as the suppression of a baffled Huguenot conspiracy. Gregory published a valuable edition of the *Decretum Gratiani* with learned notes. He died in 1585, in the 83d year of his age.

GREGORY XIV., NICOLO SFONDRATI, d. 1591; a native of Cremona. He was elected to the papacy in 1590, and died the next year.

GREGORY XV., ALESSANDRO LUDOVISIO, 1554–1623; a native of Bologna, chosen pope in 1621. The congregation for the propagation of the faith was established by him; and to him is due the secret balloting for new popes.

GREGORY XVI., BARTOLOMMEO ALBERTO CAPELLARI, 1765–1846; a Venetian who became a monk, was learned in eastern languages, and a teacher of theology. When Napoleon carried Pius VII. away as a prisoner in 1809, Capellari left Rome for his native place and remained in quiet for three years. On the return of the pope he was promoted to various important positions, and in 1826 was a cardinal and the prefect of the propaganda. In this capacity he was practically minister of foreign affairs. He made an agreement with the Netherlands touching Roman Catholic citizens, regulated church matters in the United States, and from the sultan got emancipation for the Catholics in Armenia. He was elected to the papacy Feb. 2, 1831, and for 15 years was zealous and energetic in promoting the interests and expanding the power and influence of the church.

GREGORY OF ARMENIA, commonly called THE ILLUMINATOR, was the apostle of Christianity among the Armenians. Like the majority of the bishops of the primitive church, little is known of his early history. He is said to have been educated at Cæsarea, in Cappadocia, where, at the same time, he was instructed in the Christian religion. He afterwards entered into the service of Tiridates, king of Armenia, by whom he was subjected to severe persecution on account of his refusal to worship idols. Some severe public calamity which succeeded, being looked upon as a proof of divine wrath, the king immediately put himself and his subjects under Gregory's instructions. The people were converted in great numbers, and churches immediately erected throughout the country; and Gregory, after receiving ordination at Cæsarea, returned as metropolitan of Armenia, and baptized his converts. This took place about the beginning of the 4th century. Many authors have given in their works discourses professedly by Gregory, but now believed to be spurious. The memory of Gregory is held in great reverence in the Greek, Coptic, Abyssinian, and Armenian churches, and he is one of the saints of the Roman calendar.

GREGORY, FRANCIS H., 1789–1866; b. Conn.; from merchant service he went into the navy in 1809, and rose through all grades to rear-admiral. His first work was in capturing vessels running slaves into southern ports, and suppressing piracy. In the war of 1812 he was captured and kept in England a prisoner for a year and a half. In

the war with Mexico he took an active part. When the rebellion began he was too old for active sea service, and was made superintendent of the construction of iron-clad vessels.

GREGORY OF NYSSA, SAINT, a Greek church-father, and the younger brother of Basil the great, born about 332 at Sebaste, devoted himself at an early age to the study of sciences and philosophy, and subsequently married a pious and honorable lady. In consequence of a dream, however, he separated from her, and abjuring the world, entered upon the duties of an ecclesiastic. After a short relapse into his old profane studies, he renounced this "apostasy" forever, and in 372 was made bishop of Nyssa, a city in Cappadocia, in Lesser Armenia, much to the dismay of the Arians, who knew him to be a zealous defender of the Nicene creed. They at once commenced an opposition to him. Gregory was deposed by the emperor, and compelled to flee. He lived for some years in seclusion, until, at the death of Valens (378), Gratianus restored him to his see. In 379 he was charged by the council at Antioch, to visit the churches in Arabia and Palestine, in order to restore them to their pristine orthodoxy and peace, the many years of heresy and dissension that had preceded having created a sad confusion among the flock of the faithful. In 381 he was chosen by the council of Constantinople to be one of the "centers" of faith for the Catholic communion, i.e., an arbiter of orthodoxy for his and other congregations, principally in Pontus. He further assisted at the council held in that city in 382 and 383, and played so prominent a part in both, that shortly afterwards the honorable title of metropolitan was unanimously conferred upon him. The last time Gregory seems to have appeared publicly, was at the council of Constantinople in 394; and he seems to have died shortly afterwards. The second Nicæan council conferred upon him the pre-eminent title of "Pater Patrum."

His writings are extremely numerous. Although not fraught with the glowing eloquence and penetrating acumen of a Gregory Nazianzen, or a Basil, they exhibit a greater depth of poetical feeling and philosophical thought, while, at the same time, they abound in practical teachings and wise counsels for every stage of life. The fanciful, often puerile subtleties and conceits which occur no less frequently, are rather to be put to the account of the times in which Gregory lived, when symbolism and allegory reigned supreme. On the other hand, Gregory cannot be praised too highly for having been one of the first who manfully stood out for the ancient Greek—albeit heathen—philosophy. His writings are indeed fully imbued with Platonism and Aristotelianism, and he went as far as to borrow the technical terms of these masters for his theological investigations. "As the Israelites borrowed from the Egyptians," he said, "so Christianity must carry along with it all that is costly out of the pagan camp;" a saying which, however, has been attributed to some other fathers of the early church. His orthodoxy has been questioned in later times; chiefly on account of his strongly condemning as heathenish, the view that religion was mostly dependent on the dogma: according to him, religion was more a matter of the heart and of feeling. The council of Ephesus solemnly and most energetically declared for the soundness of his teaching, refuting the heretics out of his own writings. Of his Christology—in the main that of Origen—viz., that the Logos had penetrated all parts of the human nature, and thus elevated it to himself, we will treat under this latter. The Latins celebrate the day of Gregory on Jan. 10, the Greeks on Mar. 9. His most celebrated works are a catechetic treatise; a dialogue of the Soul and Resurrection, called *Macrinia*, after his sister (supposed to have been held at her death-bed); a treatise on *The Holy Trinity and the Deity of the Holy Ghost*, besides a number of homilies. The first complete Latin edition of his writings, comprising dissertations on the Old and New Testament, dogmatical and controversial treatises, discourses, sermons, panegyrics, biographies, letters, etc., appeared at Cologne in 1537 (folio), and was followed by others at Basel (1562 and 1571), and Paris (1573 and 1603). The first Greek and Latin editions by the Jesuit Gretier appeared in Paris (1615–18), 2 vols., fol., and was reprinted there in 1638. Separate works of Gregory have been edited repeatedly, but next to none have appeared in any modern translation.

GREGORY, OLINTHUS GILBERT, LL.D., 1774–1841; b. England; a mathematician; author of *Use of the Sliding Rule*, and *Treatise on Astronomy;* prof. at Woolwich. Among his works are a *Treatise on Mechanics, Evidences of Christianity*, and lives of Robert Hall and Mason Good.

GREGORY, SAINT, the "Illuminator;" b. 257 A.D.; founder and patron saint of the Armenian church. He belonged to the royal race of the Arsacides, being the son of a certain prince Anak, who assassinated Chosroes of Armenia, and thus brought ruin on himself and his family. His mother's name was Okohe, and the Armenian biographers tell that at the time of his conception he came under the holy influence of the apostle Thaddeus. Educated by a Christian nobleman, Euthalius, in Cæsarea in Cappadocia, Gregory sought, when he came to man's estate, to introduce the Christian doctrine into his native land. At that time Tiridates I., a son of Chosroes, sat on the throne, and, influenced partly it may be by the fact that Gregory was the son of his father's enemy, he subjected him to much cruel usage, and imprisoned him for fourteen years. But vengeance and madness fell on the king, and at length Gregory was called forth from

his pit to restore his royal persecutor to reason by virtue of his saintly intercession. The cause of Christianity was now secured; king and princes and people vied with each other in obedience to Gregory's instructions, and convents, churches, and schools were established. Gregory in 302 received consecration as patriarch of Armenia from Leontius of Cæsarea, and in 318 he appointed his son Aristax to be his successor. About 331 he withdrew to a cave in the mountain Sebuh in the province of Daranalia in upper Armenia, and there he died a few years afterwards unattended and unobserved. When it was discovered that he was dead his corpse was removed to the village of Thordanum or Thortan. The remains of the saint were scattered far and near in the reign of Zeno. His head is said to be now in Italy, his right hand at Etchmiadzin, and his left at Sis.

GREGORY, OF TOURS, originally called GEORGIUS FLORENTINUS, b. 544 at Auvergne, in a family exalted by rank as well as by piety. On the paternal side, he traced his descent from Vallius Epagatus, the martyr of Lyons; on the maternal, from St. Gregory, Bishop of Langres. St. Gallus, Bishop of Clermont, Gregory's uncle, undertook his early education, and, after his death, Gregory continued his studies under St. Avitus, the successor of Gallus in the bishopric. Ordained deacon, Gregory left Auvergne, and went to the court of Siegbert, king of Austrasia. Still very young, he was elected to the see of Tours, and he was consecrated by Giles, Archbishop of Rheims. The first years of his episcopacy were a season of great perplexity, owing to the constant contentions of the first Merovingian kings. His courage and firmness, however, were equal to any of the severe tests to which they were exposed, and by openly resisting even royal authority on some occasions, he drew upon himself the hatred of Queen Fredegunda, and the ire of her husband, King Chilperich, who seems to have been a mere tool in her hands. Gregory was accused of seditious and other treasonable actions, and summoned before a council of bishops in 580. Here, however, he defended himself with such clearness and vigor, that Chilperich himself, strange to say, from that moment ceased to be his foe, and becoming even his warm admirer and friend, charged him afterwards with many important political missions. This royal partiality, however, does not seem to have prevented Gregory from occasionally calling the king a Herod and a Nero. No less favored by the king's successors, Gontram and Childebert II., Gregory did not fail to use all his influence with the court for the amelioration of the position of the church, and the general condition of his flock. His travels had, apart from their political purposes at the same time the object of everywhere restoring peace and piety, so much needed in those days in convents and churches, among the clergy and the laity. Of his journey to Rome in 590, the circumstances of which are related with a minuteness of itself surprising; of the pope's wonder at finding in Gregory, instead of the imposing man he had expected to behold, a *homuncio*, or manikin, and of his answer, that "we all are as God had made us," we can only say, that according to the lucid investigations of Dr. Kries (*De Greg. Tur. Vita et Scriptis*, p. 16) it never can have taken place. His last journey seems to have been to Orleans, whither he accompanied the king in 593. He died shortly after, in 594 or 595 at Tours, where he had been a bishop for twenty-three years. His works comprise, in the first place, his ten books of Frankish history, *Gesta, Chronicon Francorum*—the first attempt at French historiography—and have earned for Gregory the name of "Father of Frankish History," although its crudity of style, and indiscriminate mixing up of everything important and otherwise, make it partake much more of the nature of a chronicle than of a history properly so-called. Gregory's other works are: *A Book of the Glory of the Martyrs; Of the Miracles of St. Julian* (304); *Of the Glory or Miracles of the Confessors; Of the Miracles of St. Martin;* and a book of the lives of the Fathers, consisting of 23 biographies of Frankish ecclesiastics, and many other minor writings. Much more, however, is generally attributed to Gregory than is in reality his. The first critical edition of his works, by Ruinard, appeared in Paris, 1699, fol.; the latest, by Guadet and Taranne, Paris, 1836 and 1837, with a French translation. Of monographies on Gregory, we may mention *De Greg. Tur. Episc. Vita et Scriptis*, by C. G. Kries and Löbell; *Gregor von Tours und Seine Zeit* (Leip. 1835, 8vo).

GREGORY, NAZIANZEN—from his erudition in sacred literature also called the THEOLOGIAN—was b. about 329 at Arianzum, a village near Nazianzus, in Cappadocia, not far from Cæsarea. His father, whose name also was Gregory, and who had originally belonged to the heathen sect of Hypsistatics, i.e., worshipers of the Most High, but also of the fire, like the Persians, and the keepers of the Jewish Sabbath and the law of the purity of meats, had, chiefly at the instigation of his pious wife Nonna, become a convert to Christianity about the time of the great Nicæan council (325), and four years later was raised to the dignity of Bishop of Nazianzus. Formed to piety by domestic example, Gregory was at an early age sent, for the purpose of finishing his education, to Cæsarea, in Palestine, where the study of eloquence then flourished. He then visited the schools of Alexandria, and subsequently of Athens, where he met Basil the great, then also a young student, and became his most intimate friend. At the same time, there studied at Athens, Julian, later emperor and apostate, and there is no doubt that the three often met and had friendly discussions on the subjects of their common studies; although Gregory, even at that time, augured no good for Julian, who

exhibited signs of "an unsettled and arrogant mind." Gregory having made brilliant progress in eloquence, philosophy, and sacred literature, returned to Nazianzus, and here first received baptism at the hands of his own father, consecrating to God, at the same time, all "his goods, his glory, his health, his tongue, and his talents;" and, in order to be still more able to pursue a life of austere devotion, he retired into solitude, and took up his abode with Basil in the desert near the river Iris, in Pontus. Recalled by his father, Gregory was ordained priest, and afterwards fled; and being recalled a second time, he returned to Nazianzus, assisted his father in the ministry, and preached to the people. In 371 or 372 St. Basil, who in the meantime had become Bishop of Cæsarea, prevailed upon him to accept the see of Sasime, a small town in Cappadocia. But he had scarcely taken possession of his new dignity, when, overcome again by his innate repugnance of public life, he retired, a bishop without a bishopric, to Nanianzus, where he stayed until the death of his father in 373. He then went into a monastery at Seleucia, which, however, after the death of the Emperor Valen (378), he was induced to leave, in order to undertake the charge of a small Nicæan congregation in Constantinople, where, until then, Arianism had held undisputed sway. Gregory was after a short time, when his erudition and eloquence became conspicuous, elected archbishop, upon which the Arians became so exasperated that his very life was in danger. Gregory, although upheld by the Pope Damasus and the Emperor Theodosius, preferred resigning his see voluntarily, "in order to lay the storm, like another Jonah, although he had not excited it." He went back to Nazianzus, and took up his solitary abode near Arianzus, where, after some years of a most ascetic life, he died in 389. His ashes were conveyed to Constantinople, and thence, during the Crusades, to Rome. His day is, with the Latins, May 9. His character and temper, ardent and enthusiastic, but at the same time dreamy and melancholy, hard, but also tender, ambitious and yet humble, all his instability and vacillation between a life of contemplation and of action, are vividly depicted in his writings, which mostly serve the great aim of his life—to uphold the integrity of the Nicæan orthodoxy against the heresies of the Arians and Apollinarists. The merits of his writings—which vividly portray the instability and vacillation of his life—are very unequal; sometimes not inferior to the sublimest flights of poetical genius, and withal of a classical elegance and refinement, they at other times become redundant, pedantic, and heavy with far-fetched similes. Notwithstanding all this, Gregory may fairly be pronounced one of the first orators, and most accomplished and thoughtful writers of all times. His surviving works consist chiefly of about 53 orations, 242 letters, and 156 poems—meditations, descriptions, acrostics, epigrams, etc.—to which Tollius (Utrecht, 1696) has added 20 more, which he called *Carmina Cygnea*. Muratori published (Padua, 1709) 228 other unedited epigrams. The first edition of his complete works appeared at Basel in 1550, folio. Another edition appeared in Paris 1609—1611 (2 vols. fol.), by Morel, which was reprinted in Paris in 1630; Leipsic (or rather Cologne), 1690, and Venice, 1753; but none of these is sufficiently accurate. The last edition, but little improved, under the auspices of the Benedictines, appeared in 2 vols. (Paris, 1760—1840). His separate works have frequently been edited, and partly translated into different tongues.

GREGORY THAUMATUR'GUS, Wonder-worker, originally called THEODORUS, SAINT, b. at Neocæsarea, in Pontus, between 210 and 215. Sprung from an illustrious and wealthy heathen family, he was educated for a rhetorician or advocate; but an acquaintance which he formed with Origen at Cæsarea, in Palestine, allured him to the field of sacred science. Gregory forgot Roman law, applying himself instead, under his new master, with zeal and fervor to the study of the Holy Scriptures and of profane philosophy. Several years had thus passed, when Maximin's persecutions forced Origen to leave Cæsarea. Gregory then went to Alexandria, and stayed there for three years (235–238). Gordian having succeeded Maximin, Origen returned to Cæsarea, and Gregory went to join him there, and to renew his former studies under him. Most probably it was at that period also that he was baptized, and changed his heathen name of Theodorus. Recalled to his family, Gregory, instead of striving for those posts of honor for which he had been destined, retired into solitude; but was so often besought to return and labor for the church, that he allowed himself to be consecrated about 240. Installed as bishop at Neocæsarea, a wealthy and populous, but utterly unchristian city, Gregory applied himself to his holy work with the utmost zeal. He wrought, according to ancient testimony, many miracles, such as recalling devils, whom he had frightened out of a heathen temple, at his will, and thereby converting its chief functionary to Christianity; moving a stone, staying a river, killing a Jew by his mere wish, changing a lake—a matter of contest between two brothers—into solid earth, and thus contrived to change the unbelieving population of his see into devout Christians.

During the persecution of Decius, which broke out in 250, Gregory fled with a great part of his flock, whom he would not see exposed to the danger of having either to change their faith, or to die the death of martyrs, and during this flight, he, once when hard pressed by his pursuers, transformed himself and his deacon—the heathen priest whom he had converted by recalling the devils—into trees. In 251 the emperor Decius died, and Gregory returned to Neocæsarea. He now instituted a general festival for those Christians who had fallen during the persecution, and permitted the faithful to

celebrate it with banquets and sports like those which accompanied heathen festivals—a proceeding by which he intended to draw over the pagan multitude to Christianity, but which has been severely blamed, and which, indeed, was fraught with great mischief for the church in later times.

In 264 we find him, together with his brother Anthenodorus, at the council of Antioch, which had been convoked for the purpose of condemning the heresies of Paul, bishop of Samosata, their signatures occurring first in the acts of the council. Whether or not Gregory also took part in the second council (269), necessitated by Paul's refusal to abdicate, is very uncertain. Of his own extraordinary piety, devotion, truthfulness, and modesty, of his "prophetic and apostolic temper," the best testimony lies in the fact that St. Basil, St. Maximus, and other great luminaries of the church, call him a second Moses or Paul.

The only genuine works of Gregory are a panegyrical discourse on Origen, which he delivered in public before his return to his native place; the above-mentioned creed; a metaphrasis on Ecclesiastes, often and wrongly attributed to Gregory of Nazianzus, in twelve chapters; and a canonical Epistle, setting forth the punishments and penances to be undergone by such Christians as had bought booty from pagan soldiers, a practice very common in those times of constant invasions of Goths and Scythians in Asia, principally in Pontus. All other writings shown under his name are spurious. The first collected edition of his works was published by Ger. Vossius at Mayence in 1604; a more complete edition appeared in Paris, 1622, in folio.

GREIFENBERG, a small manufacturing t. of Prussia, in the province of Pomerania, is situated on the left bank of the Rega, 40 m. n.e. of Stettin. It is a decayed place, but has still some manufactures of stoves and of linen. Pop. '75, 5,630.

GREIFENHAGEN, a t. of Prussia, in the province of Pomerania, is situated on the right bank of the Reglitz, 13 m. s.s.w. of Stettin. The t. has two churches, and is the seat of considerable industry. Pop. '75, 6,759.

GREIFSWALD, a t. of Prussia, in the province of Pomerania, is situated on the Rick, about 3 m. from its mouth, and 20 m. s.e. of Stralsund. It is regularly built, and is surrounded by promenades, into which the former ramparts have been converted. Among its houses are several curious brick structures, dating from the 14th and 15th centuries. Greifswald contains, besides other public institutions, a gymnasium and a university (founded in 1456), attended by about 500 students. The university library contains about 130,000 volumes. Weaving, machine-making, salt-works, and manufactures of paper, tobacco, soap, leather, and oil are carried on, as well as commerce. Greifswald possesses some 60 ships of about 16,000 tons. Pop. '75, 18,016.

Greifswald was founded in the 13th c., before the close of which it made one in a union of Wendish Hansetowns, comprising Stralsund, Rostock, Weimar, and Lubeck. At the peace of Westphalia (1648), the town came into the possession of Sweden; but, together with the whole of Swedish Pomerania, it was conceded to Prussia in 1815.

GREINER, JOHN, 1810–71; b. Penn., but early removed to Ohio, where he was conspicuous as a whig leader. He was the first to introduce popular songs in campaign work, and wrote a large number. He was governor of New Mexico in 1852. Afterwards he edited the *Columbus Gazette* and the *Zanesville Times*. His last public position was sub-treasurer in Santa Fé.

GREIZ, a t. of central Germany, capital of the principality of Reuss-Greiz, and seat of the sovereign prince, is charmingly situated on the right bank of the White Elster, 49 m. s.s.w. of Leipzig. It is well-built, is surrounded by walls, and contains three castles, one for winter, another for summer occupation, with beautiful gardens and park; the third, which is built on an isolated rock, is used for public offices. The town-house, a handsome specimen of Gothic, was built in 1841. Nearly 3,000 hand-looms are here employed in the manufacture of woolen and half-woolen goods; one factory contains 500 looms. Pop. '75, 12,657.

GRELLET, STEPHEN, 1773–1855; b. France. He was one of the body guard of Louis XVI.; but after the king's execution fled to Demerara. He was in New York in 1795, and there abjured the Roman Catholic religion and joined the Friends. During the yellow fever in Philadelphia in 1798, he was untiring in attentions to the sick and the dying. Subsequently he traveled over the union, Canada, England, France, Germany, and the Scandanavian kingdoms as a missionary. He also visited Russia, Greece, and Italy; and held audiences with the czar and pope, delivering a sermon before his holiness. A few years afterwards he made another tour in Europe, when he settled in Burlington, N. J., where he died.

GRENADA, an island of volcanic origin in the British West Indies, is said to be the most beautiful of the Caribbees. With an area of 133 sq.m., it contained in 1871, 37,684 inhabitants, mostly of African descent. Of these only 400 or 500 are whites, the rest are people of color. Very considerable importations of coolies have taken place. On the coast are several good harbors; while a central ridge of mountains here and there presenting an elevation of 3,000 ft., possesses various extinct craters, some of them transformed into considerable lakes. The chief towns are St. George, St. Mark, St. Patrick, St. Andrew, and Charlotte Town. The first of these, which is the seat of

government, stands in lat. 12° 2′ n., and in long. 61° 48′ west. In 1866 there were 27 schools, consisting of the normal and grammar school, the central schools, and parish schools, with an attendance of 1418. The public revenue amounted in 1875 to £26,570. The imports and exports were respectively represented by £118,385 and £171,332; the corresponding results in 1833, virtually the last year of unmitigated slavery, having been £73,846 and £288,683. Among the exports are sugar, cotton, and cocoa; the last of which seems likely to become the staple.—The island was discovered by Columbus on his third voyage in 1498, at which time it was inhabited by Caribs, who were subsequently exterminated by the French, into whose hands Grenada came about the middle of the 17th century. It finally fell into possession of the British in 1783.

GRENADA, a co. in n. central Mississippi on Yellabusha river, and the New Orleans, St. Louis and Chicago railroad; 450 sq.m.; pop. '70, 10,751—6,642 colored. The surface is level, and about half is covered with forests. The soil is good; chief productions: cotton, corn, and pork. Co. seat, Grenada.

GRENADE', a small shell, about three in. in diameter, of iron or annealed glass, filled with powder, and thrown from the hand. Hurled among dense masses of troops, as those assembled in the ditch of a fortress during an assault, grenades are particularly embarrassing, the splinters inflicting deep wounds and causing great confusion. The discharge is effected by means of a small time-fuse. Grenades are occasionally rolled over the parapet, through wooden troughs, into the trench below; there is also a species of hand-gun fired from a rest, called "musketon," from which grenades may be projected to a short distance. These missiles are said to have been first used in the year 1594.

GRENADIER', originally a soldier who was employed in throwing hand-grenades, but in modern parlance a member of the first company of every battalion on foot, in which the tallest and finest men of the regiment are placed. This company used to be distinguished from the rest by tall bear-skin caps; it holds the place of honor, viz., the right, when in line, and the front when in column of attack.

GRENADIER GUARDS, the first regiment of foot guards in the British household brigade of guards, and generally considered the finest corps in the army. It comprises 2,540 officers and men, divided into three battalions. The officers of this fashionable corps are usually from the families of the nobility or more distinguished landed gentry. The first foot guards, under which name the regiment was originally known, was first raised in 1660; since then it has ever borne an honorable position in all the wars of the country, and especially in the Peninsula, at Waterloo, and in the Crimea.

GRENADINES', a chain of islets in the West Indies, extending between Grenada, on which they are chiefly dependent, and St. Vincent, from lat. 12° 30′ to 13° north. They vary in size from about 7,000 acres downwards. The largest is Carriacou. Much inconvenience is caused by their deficiency in streams and springs, an evil which, of late years, has been increasingly felt, from the injudicious destruction of the timber.

GRENELLE, a suburb of Paris (q.v.).

GRENO'BLE (a corruption of the Lat. *Gratianopolis*, or City of Gratian), an important town and strong fortress of France, with double inclosures, capital of the department of Isère, is pleasantly situated on both banks of the river of that name, in a beautiful and fertile district, surrounded by high mountains, and about 58 m. s.e. of Lyon. It is divided by the Isère, which is here confined within handsome quays, into two unequal portions: the one, narrow and contracted, and consisting of only two streets, situated on the right bank of the river at the foot of a hill, is called Saint Laurent; the other, a much more important quarter, containing all the public buildings, and consisting of spacious and well-lighted streets, on the left bank, is called Bonne. Among the public buildings are the Palais de Justice, with a Gothic oriel, originally the palace of the Dauphin, and the most interesting old building in the town; the Académie Universitaire; the town-hall; the public library, containing 100,000 volumes and 1500 MSS.; and the picture-gallery. Grenoble has gained a reputation for its manufactures of gloves (in making which above 20,000 persons are employed at more than 100 factories), leather goods, watches, liquors, perfumes, chemicals, and silk. There is besides a brisk trade in hemp, iron, wood, and cheese. Pop. '76, 43,054.—Grenoble, originally a city of the Allobroges, was fortified by the Romans. It was Burgundian in the 5th c., and later belonged to Dauphiné.

GRENVILLE, a co. in Ontario, Canada, on the St. Lawrence and Rideau rivers, and traversed by the Grand Trunk and the St. Lawrence and Ottawa railroads; 464 sq.m.; pop. '71, 22,616. Chief town, Prescott.

GRENVILLE, GEORGE, an English statesman and reputed author of the stamp act, which first drove the American colonies into resistance, was born in Oct., 1712. He was brother to Richard Grenville, lord Temple, and brother-in-law of the earl of Chatham. He entered parliament in 1741, and from 1744 to 1762 filled several minor government offices. In 1757 he introduced a bill for the regulation of the payment of the navy. In 1762 he became secretary of state, and then first lord of the admiralty; and in the following year he succeeded lord Bute as prime minister, uniting in himself the offices of chancellor of the exchequer and first lord of the treasury. He resigned the premiership

in 1765, and died in 1770. Grenville was distinguished for eloquence, public spirit, business qualities, and extensive knowledge; but his imperious nature made him an unpopular minister, alike with the king, the parliament, and the people.

GRENVILLE, RICHARD TEMPLE. See TEMPLE, EARL.

GRENVILLE, WILLIAM WYNDHAM, Lord, third son of the preceding, was b. in Oct., 1759. After studying at Eton and Oxford with brilliant success, he became a member of the house of commons in 1782, and attended his eldest brother, lord lieutenant of Ireland, in the character of secretary. Soon after he became paymaster-general of the army, and in 1789 was chosen speaker of the house of commons. In 1790 he was appointed secretary of state for the home department, and was raised to the peerage with the title of baron Grenville. He became foreign secretary in the ensuing year. He resigned office, along with Pitt, in 1801, on the refusal of George III. to give his assent to the Catholic emancipation bill. He was premier in 1806–07. In 1809 he was chosen chancellor of the university of Oxford. From 1809 to 1815 he acted along with earl Grey, and he generally supported Mr. Canning. Lord Grenville was an able speaker, with much influence among the peers, and an excellent scholar. He died in 1834.

GRENVILLE, GREENVILLE, or GRANVILLE, Sir RICHARD, 1540–91; a relative of sir Walter Raleigh. While a boy he served against the Turks in a German corps. Returning home, he was given a command in Ireland, and became sheriff of Cork. In 1571 he was in parliament; subsequently, sheriff of Cornwall; again in parliament, and knighted by queen Elizabeth. He was enthusiastic in Raleigh's projects for founding colonies in America, and in 1585 was chief officer of a fleet carrying 108 settlers to Carolina. On the way he captured two Spanish frigates, and finally landed at Roanoke. Leaving the settlers in charge of Ralph Lane, he returned to England, and on the way took a Spanish ship with a rich cargo. He returned the next year with supplies, but found the colony scattered, the people having been taken away by sir Francis Drake. In 1591 he was made rear-admiral, and sent with a small fleet against the Spaniards to the West Indies. Off the Azores he had a hard fight, sinking four of the enemy's ships, and killing, it is supposed, 1000 men. He was wounded, but refused to leave the deck. Finally, he was shot through and died three days afterwards.

GRESHAM, Sir THOMAS, founder of the London royal exchange, descended from an ancient Norfolk family, was the second son of sir Richard Gresham, an opulent merchant, elected in 1537 lord mayor of London. Born in 1519, he was first apprenticed to his uncle, sir John Gresham, a wealthy London mercer, and then sent to study at Gonville hall, now Caius college, Cambridge. In 1543 he was admitted a member of the Mercers' company. His father, who died in Feb., 1548, had been one of Henry VIII.'s domestic financial agents; and in 1552 Gresham was sent to Antwerp, as king's factor there, in consequence of the mismanagement of the person previously in charge. In two years he paid off a heavy loan, entirely restored the king's credit, and introduced a new system of finance. The principal duty of the royal agent was the negotiation of foreign loans; and during the long period he held the office, he was successfully employed in many most important and difficult money transactions. As he was a Protestant, queen Mary, on her accession, sent him his dismissal; but on presenting a memorial of his past services, he was soon reinstated. By queen Elizabeth, he was, in 1559, knighted, and appointed, for a short time, English ambassador at the court of the king of Spain's regent at Brussels. The troubles in the Netherlands compelled him, in 1568, to withdraw finally from Antwerp, to which city he had made more than forty journeys on the service of the state, in one of which, in 1560, he was thrown from his horse, and rendered lame for life. In 1569 by his advice, the plan of borrowing money from the London merchants, instead of from foreigners, was adopted, to the great advantage of the mercantile body. Having, in 1564, lost his only son, Richard, he resolved upon devoting a portion of his great wealth to the erection of a bourse or exchange, in imitation of the one at Antwerp, for the London merchants, who were wont to meet in the open air—a project which had originated with his father. It was formally opened, in 1570, by queen Elizabeth in person, on which occasion she dined with the founder, and named it the royal exchange. Renowned for his hospitality and liberality, he frequently entertained foreign personages of distinction, and erected a magnificent mansion at Osterly park, near Brentford, where he was visited by queen Elizabeth. For the endowment of a college in London, he directed by his will that his town-mansion in Bishopsgate street should be converted into a residence and lecture-rooms for seven professors, to be salaried out of the royal exchange revenues. Gresham college was taken down in 1768, and the ground on which it stood—now occupied by the excise office—was transferred to government. The lectures are now delivered in a lecture-hall built at the corner of Basinghall and Gresham streets, out of the accumulated fund. The subjects of lecture are divinity, physic, astronomy, geometry, law, rhetoric, and music. Gresham also provided for the erection and support of eight almshouses, and made many other charitable bequests. He died suddenly, Nov. 21, 1579.

GRESLON, ADRIEN, 1618–97; b. France. He was a Roman Catholic missionary in the Huron country, and some time later in China. There is a story that he met an

American Indian woman in Tartary who had been sold from one tribe to another. It was discovered from this that there was ready communication between Asia and western America.

GRESSET, JEAN BAPTISTE LOUIS, 1709–77; a French poet, author of *Vert Vert; Le Carême Impromptu; Le Lutrin Vivant; La Chartreuse; Les Ombres;* and other works in verse, and dramatic pieces. In 1748 he was made a member of the Academy. Later in life he became subject to deep religious impressions, and publicly regretted the frivolous nature of some of his writings, for which he was sharply censured by Voltaire.

GRESWELL, EDWARD, 1797–1869; b. England, graduated at Oxford, and turned his attention to theological writing. Among his works are *Exposition of the Parables and Parts of the Gospels; Dissertation upon the Principles and Arrangement of a Harmony of the Gospels,* and a dissertation on the calendar, besides some books in Latin.

GRETA, a river in Yorkshire, Eng., running e. and n. to the Tees. Another of the name is in Cumberland, and empties into the Derwent.

GRETNA GREEN, originally the name of a farmstead in the vicinity of the village of Springfield, in the parish of Graitney, in Dumfriesshire, Scotland, but frequently applied to the village of Springfield itself, which is situated about a mile and a half n. of the north-eastern extremity of the Solway Firth. The village was long the center of extensive smuggling operations, and more recently it became famous (or infamous) for its irregular marriages. See next article.

GRETNA GREEN MARRIAGES, the name given to marriages of English persons contracted at Gretna Green. This spot being the first convenient halting-place for runaway couples from England, gave the name to this kind of marriage, originally an easy mode of evading the English marriage act, which required the consent of parents and guardians, publication of bans, and the presence of a priest—all of which involved considerable publicity and an inconvenient delay, but which were got rid of by the parties passing the English border into Scottish ground. The rule being, that a marriage is valid if contracted according to the law of the place where the parties enter into the contract, it was easy for English couples to avail themselves of the mode of contracting marriage allowed by the law of Scotland, which required nothing but a mutual declaration of marriage to be exchanged in presence of witnesses—a ceremony which could be performed instantly—and it was immaterial whether the parties were minors or not. This declaration generally took place in presence of a blacksmith, who in reality was no more necessary than any other witness, but who gradually assumed an authority which imposed on the credulity of the English strangers, and thereby profited by the liberality usually dispensed on such auspicious occasions for his trifling services. The declaration of marriage being exchanged, the parties could return at once to England, and their marriage was held ever after to be valid there and all the world over.

These marriages have received much discouragement of late. Not only has the strictness of the English law of marriage been dispensed with, by allowing marriages to be contracted in England in comparative secrecy before the superintendent registrar, without going before a priest, but the Scotch law has also been altered, with a view of checking this evasion of English law. By 19 and 20 Vict. c. 96, no irregular marriage of that kind in Scotland is now valid unless one of the parties had at the date thereof his or her usual place of residence there, or had lived in Scotland for 21 days next preceding such marriage. The effect of this statute is, therefore, an obstacle to runaway marriages from England so far that one of the parties must at least have resided in Scotland 21 days.

GRÉTRY, ANDRÉ ERNEST MODESTE, 1741–1813; b. France. He studied music under many disadvantages, but his composition for Marmontel's *Le Huron* brought him at once into notice. After this came *Lucile; Zémire et Azor; Céphale et Procris; Richard Cœur de Lion; Barbe-Bleue,* and many other operas, both comic and serious. He had been 16 years dead when his *William Tell* was produced. Grétry was one of the founders of French comic opera.

GREUZE, JEAN BAPTISTE, 1726–1805; a painter, b. France. Having no success at portraits he undertook compositions on natural subjects and current life, though much preferring allegorical, scriptural, and historical work. Among his best achievements are "The Blind Man Cheated;" "The Village Bride;" "The Broken Pitcher;" "The Unnatural Father," and "The Little Girl and the Dog." Many of his productions have been issued in engravings. He was remarkable as a colorist, particularly for flesh-tints, and for his originality in genre painting.

GREVILLE, CHARLES CAVENDISH FULKE, 1794–1865; great-grandson of the fifth earl of Warwick. He was educated at Eton and Oxford, and became clerk of the council in 1821, which office he held nearly 40 years, serving under three sovereigns. Well-born, well-bred, handsome, and accomplished, Greville led the easy life of a man of fashion, taking an occasional part in the transactions of his day, and much consulted in the affairs of private life. But the celebrity which now attaches to his name is entirely due to the posthumous publications of a portion of a journal or diary which it was his practice to keep during the greater part of his life. These papers were given by him to his friend Mr. Reeve, a short time before his death, with an injunction that

they should be published, as far as feasible, at not too remote a period after the writer's death. The journals of the reign of George IV. and William IV. (extending from 1820 to 1837), were accordingly so published about 10 years after the event. Few publications have been received with greater interest by the public; five large editions were sold in little more than a year, and the demand in America was as great as in England. These journals were regarded as a faithful record of the impressions made on the mind of a competent observer, at the time, by the events he witnessed and the persons with whom he associated. Their characteristic is the love of truth, of justice, and of sincerity. The court was irritated at the scornful disclosure of the vices and follies of former sovereigns, and fashionable society was annoyed at the writer's absolute indifference to its pretensions. But Greville did not stoop to collect or record private scandal. His object appears to have been to leave behind him some of the materials of history, by which the men and actions of his own time would be judged. He records not so much public events as the private causes which led to them; and perhaps no English memoir-writer has left behind him a more valuable contribution to the history of this century. Greville published anonymously, in 1845, a volume on the policy of England to Ireland, in which he advocated the payment of the Roman Catholic clergy; he was also the author of several pamphlets on the events of his day. [*Encyc. Brit.*, 9th ed.]

GREVILLE, Sir FULKE, Lord BROOKE, 1544—1628; an English poet, educated with his cousin, sir Philip Sidney. He traveled abroad and became acquainted with some continental languages. In 1620 he was made a peer. Eight years afterwards he was murdered by a servant who was so stricken with horror at the deed that he killed himself with the same sword. Among Greville's works are a biography of Sidney, a treatise on human learning, another of fame and honor, and one on war, besides poems.

GRÉVY, FRANÇOIS PAUL JULES, the president of the French republic, was b. Aug. 15, 1813, at Vandrez in the Jura, studied law, and became an advocate at Paris. He took part in the revolution of 1830, and in 1848 was returned to the constituent assembly. There he held an independent position, but was generally ranked with the extreme left. After Louis Napoleon's *coup d'état*, Grévy withdrew from politics and devoted himself to his professional work. He returned to political life in 1868. After the Franco-German war he was appointed president of the national assembly, a post he resigned in 1873; and after the general election of 1876 he again became president of the chamber. When in Jan., 1879, Marshal MacMahon resigned the presidency of the republic, Grévy, who is a thorough-going but not extreme republican, was by a large majority elected his successor. Grévy has never been a blind partisan, and he enjoys the respect and even the confidence of all parties.

GREW, MARY, b. Conn., 1813; daughter of Henry Grew, a Baptist clergyman; educated in Catherine E. Beecher's seminary in Hartford. In her youth, when New England was greatly agitated by the controversy between the old-school and new-school theology, she received a training in metaphysics which made her a skillful logician. In childhood she was deeply interested in the condition of the colored people, both free and slave, and was therefore prepared to adopt the fundamental principle of immediate emancipation of slaves as the duty of the master and the right of the slave. Her public addresses combined the skill of the trained logician with the warmth of womanly sympathy, and she was therefore highly popular as a speaker. She was not less skillful with the pen. As corresponding secretary of the Philadelphia female anti-slavery society, she wrote its annual reports for nearly or quite 30 years in succession, and so unique were they in their impressiveness that they excited a degree of public attention rarely awarded to such documents. At different times also, she was the editor of the *Pennsylvania Freeman*, the organ of the Pennsylvania anti-slavery society. She was educated a Baptist, but is now connected with the Unitarians, in whose pulpits she occasionally preaches. She is an earnest advocate of woman suffrage. She has resided in Philadelphia since 1834.

GREWIA, a genus of trees belonging to the natural order *tiliaceæ*, having simple and more or less ovate leaves, and a drupaceous fruit containing four 2-celled and 2-seeded nuts. They are African and Asiatic, mostly tropical and subtropical. Some species, as *G. sapida* and *G. Asiatica*, natives of the warmer parts of India, yield pleasant fruits, much used in the manufacture of sherbet. By the inhabitants of the Himalaya, the inner bark or bast of *G. oppositifolia* is used for the same purpose as that of the lime tree in Europe; and the leaves of *G. didyma* and other species are given as fodder to cattle, and dried and stacked for winter use. The wood of *G. didyma* is used for boats. That of *G. elastica* is much valued for purposes requiring strength and elasticity, as for making bows and the shafts of carriages.

GREY, a co. in n.w. Ontario, Canada, on Georgian bay; 1,800 sq.m.; pop. '71, 59,395. The land is good for all ordinary agricultural uses. Chief town, Owen Sound.

GREY, CHARLES, Earl, K.G., head of the government which carried the reform bill, was b. Mar. 13, 1764, at Fallowden, near Alnwick. The Greys are a Northumberland family of great antiquity, celebrated for military achievements, and first ennobled in the time of Edward IV. The first earl was sir C. Grey, K.B., a distinguished soldier, who held commands in the first American war, and in the war against the French republic.

His son was sent to Eton, and thence to Cambridge. He then visited the continent; and in his 22d year entered the house of commons as M.P. for his native county. He became a follower of Mr. Fox, and his maiden speech was in opposition to the address of thanks to the king for negotiating the commercial treaty with France. He soon obtained a leading position in the house of commons, and was one of the managers of the impeachment of Warren Hastings. He was also one of the founders of the society of friends of the people. In 1793 he was selected to present a petition from this society, in which the defects and abuses of the representative system were forcibly exposed. He was outvoted on this occasion, and again in 1797. In 1799 he opposed the proposal for the Irish union, but recommended the abolition of forty rotten boroughs in Ireland as a means of securing the independence of Irish members. When the whig administration of lord Grenville came into office in 1806, Grey, now lord Howick, became first lord of the admiralty. Mr. Fox died in Sept., and was succeeded by Grey as secretary of state for foreign affairs, and leader of the house of commons. The cabinet was broken up in 1807, but not before it had carried the abolition of the slave trade, and the enlistment of soldiers for a limited period instead of for life. It was unfortunate, both for Grey and the whigs, that he was, by the decease of his father in 1807, removed from the house of commons, where he might have led the opposition to the upper house, where his advocacy of measures of progress and amendment found little response. Grey and lord Grenville, as the leaders of the whig opposition, were more than once desired by the prince of Wales, after he became regent, to coalesce with the tory ministry, but these overtures were firmly rejected. Grey actively opposed the bill of pains and penalties against queen Caroline. During the long period in which he remained in opposition, from 1807 to 1830, he gave a strenuous support to the abolition of religious tests, the removal of Roman Catholic disabilities, and the amelioration of the criminal code. The year 1830 was a period of great political disorder and discontent. The French revolution had familiarized the bolder and more ardent spirits with the idea of resistance to the government. Nightly conflagrations in the agricultural districts alarmed the timid. When parliament met in Nov. Grey gave warning of the approaching hurricane, and again urged the adoption of measures of temperate reform. It was in answer to this speech that the duke of Wellington made his memorable declaration against reform, and expressed his admiration of the existing system of representation. This was the death-blow to the duke's government. Being outvoted on a motion of sir H. Parnell on the civil list, the cabinet resigned, and William IV. sent for Grey, who formed a whig government, of which he was of course premier. The whigs set to work in good earnest to clear away the gross abuses and nests of corruption which had accumulated during nearly seventy years of toryism; above all, a great comprehensive, and searching measure of parliamentary reform was prepared by a subcommittee of the cabinet, consisting of lord J. Russell, lord Durham, lord Duncannon, and sir J. Graham. The bill was brought into the house of commons, Mar. 1, 1831, by lord J. Russell, and electrified the nation. It was, however, fiercely opposed in both houses. General Gascoyne carried a resolution against reducing the number of M.P.'s. Grey thereupon advised the king to dissolve parliament. "The bill, the whole bill, and nothing but the bill," was the watchword at the elections; and when the new parliament met, the bill was carried through the lower house by large majorities. The second reading was moved by Grey in the house of lords, Oct. 3, 1831. After five nights the bill was thrown out by 199 votes against 158. The reply of the house of commons was an immediate vote of confidence in the ministers. The king prorogued parliament in order that after the shortest possible interval, the bill might be again introduced. Riots took place at Nottingham, Derby, and Bristol. At Birmingham 150,000 men threatened to march upon London. The metropolis was in a fever of excitement. A second reform bill passed the house of commons, which also passed a second reading in the house of lords, the tories being determined to mutilate it in committee. Lord Lyndhurst moved the postponement of the disfranchising clauses, and the whigs being beaten, Grey resorted to the extreme remedy of demanding from the king a new and large creation of peers. The king refused his consent, and Grey resigned. The popular excitement increased. The king sent for the duke of Wellington, but sir Robert Peel refusing to join the duke in the attempt to form a government, Grey again returned to office, armed with the power of creating as many peers as might be necessary to secure the safety of the bill. On June 4, 1832, the reform bill passed the house of lords, and Grey's friends crowded round him to congratulate him on having crowned his long, honorable, and consistent public career by a measure of such immense advantage and importance. Grey took office on the principles of peace, retrenchment, and reform. His government, however, lost a good deal of its popularity in England by his deference to the hostility of the lords, and his attempt to conciliate his opponents by a division of patronage. In Ireland Mr. Stanley's quarrels with Mr. O'Connell and the Irish repealers also tended to weaken the government. Many important measures were, however, passed—the measure for national education in Ireland, the Irish church temporalities bill, and the bill for abolishing slavery in the West Indies. In Dec., 1834, the Grey ministry fell to pieces on the Irish coercion act. Grey retired from the post of first lord of the treasury with the respect and esteem of the entire nation. A more honorable man never existed. A moral dignity stamped his every action, and over his

truthfulness no cloud ever passed. He passed the last ten years of his life in comparative retirement, and died at his family mansion, Howick house, July 17, 1845. His personal appearance was stately and dignified, his gestures were animated, and his tones lofty and sonorous. He left eight sons and four daughters to lament the loss of a most revered parent.

GREY, Sir GEORGE, K.C.B., governor and commander-in-chief of New Zealand, was b. at Lisburn, Ireland, in 1812. He was educated at the royal milltary college at Sandhurst, and on attaining his captaincy, offered to explore the interior of Australia, then but little known, and on receiving the requisite permission from the colonial office, started on his arduous mission in 1837. In Sept., 1838, he organized another expedition to explore the Swan River district. He returned to England in 1840, and began his *Journals of Two Expeditions of Discovery in North-western and Western Australia during* 1837–8–9. His enterprise and ability obtained for him, unasked, in 1841, from lord J. Russell, then colonial secretary, the post of governor of south Australia. In 1846 he was made governor of New Zealand. Both here and in Australia his first task was to acquire the language of the natives, with whom he became more popular than any preceding governor. His government appeared to the authorities at home to be so wise and conciliatory, that in 1848 he was made K. C. B. (civil), and in 1854 was appointed governor and commander-in-chief of the cape of Good Hope. The task of allaying the asperities and irritation left by the Kaffir war demanded high powers of statesmanship; Grey was, however, equal to the occasion. Industry revived, and brighter days began to dawn upon the colony. In 1858, however, the colonial office interfered with measures which he considered necessary, and he threw up his post, and came to England. Public opinion at the cape was so strongly manifested in his favor, that he was requested by the government to resume his governorship. On the breaking out of the Indian mutiny, Grey sent every soldier he could spare to the assistance of the Indian government, and received the acknowledgments of the British government and parliament for his promptitude and energy. In 1861 he was again appointed governor of New Zealand, in the hope that he would bring the war then raging there to a satisfactory conclusion. The natives received him with joy and veneration, and he succeeded in bringing about pacific relations with the Maories. He resigned his office and returned to England in 1867, but afterwards resided for a time in New Zealand, where he took a prominent part in resisting the absorption of the provincial powers by the central colonial government. Grey is the author of *Journals of Discovery in Australia* (1841); *Polynesian Mythology* (1855); and *Proverbial Sayings of the Ancestors of the New Zealand Race* (1858).

GREY, HENRY GEORGE, Earl, b. England, 1802; educated at Oxford, and under the title of lord Howick in 1826 a member of the house of commons. In his father's ministry formed in 1830 he was under secretary for the colonies, and afterwards for the home department. Under Melbourne he was secretary of war. After the death of his father in 1845 he took his place in the house of lords, as earl Grey. Under the Russell administration he was secretary for the colonies, retiring in 1852, in which year he published an *Essay on Parliamentary Government as to Reform.*

GREY, Lady JANE, an English lady of royal birth and singular misfortunes, was the eldest daughter of Henry Grey, marquis of Dorset, afterwards duke of Suffolk, and lady Frances Brandon. Lady Frances was the daughter of Charles Brandon, duke of Suffolk, and of Mary, sister of Henry VIII., who had been married to Louis XII., of France, but had become a widow. Lady Jane Grey was born at Broadgate, Leicestershire, in 1537. Having discovered, at an early age, surprising talents, she was furnished with an excellent tutor, Aylmer, afterwards bishop of London, and under his care, made extraordinary progress in arts and sciences, and particularly in languages, being able to speak and write Latin and Greek, as well as French and Italian. We have the testimony of Roger Ascham, that he found her reading the *Phædon* of Plato in Greek, while the rest of the family were engaged in hunting. She also sang and played well, and was versed in other feminine accomplishments.

In 1553, after the fall of Somerset, the dukes of Suffolk and Northumberland, now ruling in the name of the youthful king Edward VI., and foreseeing his speedy death, determined to change the succession to the crown, and secure it to their own families. Lady Jane Grey, now sixteen years old, was therefore married to lord Guilford Dudley, fourth son of the duke of Northumberland, in May, 1553. The king, failing in body, and weak in mind, and surrounded by selfish or fanatical advisers, was persuaded to make a deed of settlement, setting aside the right of succession of his sisters Mary and Elizabeth, and Mary Queen of Scots, leaving the crown to lady Jane, who was innocent of the conspiracy. After the king's death her ambitious relatives hailed her as "queen." Lady Jane at first shrunk from honor so treacherously won, but ultimately yielded to the force of their entreaties and commands, and allowed herself to be proclaimed. The people of England resented the unscrupulous conduct of Suffolk and Northumberland, and learned, brilliant, and amiable as lady Jane was, they rallied, with the true English instinct of loyalty, round Mary. Northumberland was defeated, sent to the tower, and beheaded Aug. 22, 1553; and in the following Nov. lady Jane and her husband were also condemned. For a while Mary hesitated to pronounce sentence of death against the young couple, but at length she issued the fatal warrant on Feb. 8, and, four days

after, both were executed. Lady Jane reigned only ten days. She met her fate with remarkable firmness, making a brief address, in which she confessed the justice of her sentence; but said: "I only consented to the thing I was forced into." Several epistles and other writings attributed to her are extant.

GREY FRIARS. See FRIAR.

GREYHOUND, a kind of dog distinguished by great slenderness of form, length of limbs, elongation of muzzle, swiftness, and power of endurance in running. There are varieties differing in other less important characters, but these are common to all. They have also prominent eyes and very keen sight, but their scent is not acute, and they pursue their prey not by the scent, like the hounds (q. v.) properly so called, but by keeping it in view. Some varieties, however, as the *Scottish greyhound,* probably from being crossed with the staghound or some other of the hounds, combine superior powers of scent with the ordinary qualities of the greyhound. Greyhounds have the parietal bones convergent, not parallel as in the hounds. The face exhibits an almost straight line from between the ears to the nose. The ears are small and sharp, half pendulous in the varieties best known in Britain, but quite erect in some of those of other countries. The chest is deep; the belly much contracted; the paws are small; the hair is long and rough in some varieties, short and smooth in others; the tail is long and slender, curved up at the tip, and in the common smooth-haired greyhounds of Britain and the w. of Europe, is covered with hair similar to that of the rest of the body; but there are other varieties with a bushy tail. It is probable that the greyhound originally belonged to some of the wide plains of central Asia, or to the n of Africa; it has been very long employed by man as a hunting-dog; it is figured in the monuments of ancient Egypt, and has been common from the earliest historic times in India, Persia, and other countries of Asia, as it has been also in Greece, and generally throughout Europe. To the western parts of Europe, however, there is every probability of its having been brought from the east; and old records show that a very high value was set upon it. It was long employed chiefly in the chase of deer; and on one occasion queen Elizabeth was entertained with the pleasant spectacle of "sixteen bucks, all having fayre lawe, pulled down with greyhounds," which she viewed from a turret at Cowdrey Park, in Sussex, the seat of lord Montacute. The right to possess greyhounds was a proof of gentility; and the effigy of this dog often appears at the feet of monumental figures of knights in armor. The killing of a greyhound in the good old times was a felony, punished as severely as murder.

The smooth-haired variety of greyhound, at present so common in Britain, and used for hare-hunting or "coursing," was imported from France, and improved by further importations from Greece, Italy, the n. of Africa, and India. The varieties previously in use were rough-haired, and some of them larger and stronger. The *Irish greyhound,* now almost if not altogether extinct, was large and powerful, so that whilst wolves existed in Ireland, it was used to hunt them. The *Italian greyhound,* is a very small and delicate variety, of gentle manners, well known as a drawing-room pet. Greyhounds do not, however, generally show the strong attachment to particular persons so common in other dogs; and although so long reduced to the service of man, are inferior to many other dogs in the degree of their domestication. Yet the Grecian and Turkish greyhounds have been trained to stop if a stick is thrown among them when in full pursuit of a doubling hare. A whole pack will thus be stopped, and then one, singled out, will pursue the game.

The fleetness of the greyhound is well illustrated by an anecdote, related in Daniel's *Rural Sports,* of a brace of greyhounds in Lincolnshire running after a hare a distance of upwards of four miles in twelve minutes—the increase of distance by turns not being reckoned—when the hare dropped dead.

Various etymologies of the name greyhound, have been proposed, than which none is more probable than that which refers it to the prevalence of a gray color in the breeds once most common. Another derivation is from *Graius,* Grecian. The *gazehound,* mentioned by old writers, is supposed to be the greyhound, the name being probably given when a pure breed, hunting by sight alone, began to be introduced.

GREYLOCK, a mountain near the village of South Adams, Berkshire co., Mass., 3,500 feet in height; the highest land in the state, commanding a remarkably fine view, overlooking the valley of the Hoosac and its villages on the n., beyond which are visible the peaks of the Green Mountains; a little to the e. 60 m. off are Mts. Monadnock and Wachusett; 40 m. s.e. are Holyoke and Tom; on the s. the Berkshire hills and Mt. Everett, and Pittsfield and its lakes and villages; s.w. far away across the Hudson are the Catskills. Near to Greylock are Saddle Ball and Saddle Mount.

GREYTOWN, SAN JUAN DE NICARAGUA, or SAN JUAN DEL NORTE, the chief seaport of Nicaragua at the mouth of the San Juan near the Caribbean sea; 10° 55′ n.; 83° 42′ w.; pop. about 1200. The harbor, if not neglected, would be one of the finest on the coast. The famous Nicaragua route for a ship-canal to the Pacific begins at Greytown. The place has considerable trade in India-rubber, hides, cocoa-nuts, rose-wood, etc.

GREYWACKE (Ger. *Grauwacke*), a partially translated German word, used as the name of an indurated argillaceous rock, common in, though not confined to, Silurian and Cambrian strata. The great bulk of the Silurian strata s. of Scotland is composed of this rock.

GRICES, in heraldry, are young wild boars.

GRIDLEY, JEREMY, 1702–67; b. Boston; educated at Harvard, and was for a short time editor of a newspaper called the *Weekly Rehearsal*. He was eminent as a lawyer, and became attorney-general for the province.

GRIDLEY, RICHARD, 1711–96; b. Boston. He was in the engineer service at the siege of Louisburg, was in the Crown Point expedition in 1756, and erected the works at lake George. He served under Amherst and Wolfe, and when the revolution began he directed the construction of the works on Breed's hill the night previous to the Bunker hill battle. He rose to the rank of maj.gen.

GRIERSON, BENJAMIN H., b. Penn. 1837. In the war of the rebellion he rose from maj. to maj.gen. of volunteers, and was especially famous as a leader of dashing and hazardous cavalry expeditions or raids. After the war he was appointed col. of cavalry in the regular army.

GRIESBACH, JOHANN JAKOB, author of the first critical edition of the New Testament, was b. at Butzbach, in Hesse-Darmstadt, Jan 4, 1745. While Griesbach was still a child, his father was called to St. Peter's church, in Frankfort-on-the-Main, where he was also made consistorial counselor. Griesbach accordingly received his first education at the gymnasium of that city, and afterwards studied theology at Tübingen, where the old dogmatic was still predominant; at Halle, where Semler influenced his whole after-life; and at Leipsic, where he became acquainted with Ernesti. Having resolved to devote himself specially to the criticism of the New Testament text, which had become a favorite study among theologians, Griesbach undertook a journey to various libraries of Germany and Holland, to London, Oxford, Cambridge, and Paris. On his return he published his *De Codicibus Evangeliorum Origenianis* (1771), and commenced lecturing as *privat-docent* in Halle. In 1773 he was made extraordinary professor; but in 1776 was called as ordinary professor to Jena, where he continued to teach with great success, and in the enjoyment of many honors, till his death on Mar. 24, 1812. The great work with which his name is associated is his critical revision of the New Testament text. Besides pointing out new sources for the discovery of the original reading, attempting a history of the sacred text (*Curæ in Historiam Textus Epp. Paul.*, 1777), and laying down more certain laws of criticism (*Symbolæ Criticæ ad Supplendas et Corrigendas Varias Lectiones N. Test.*, 2 vols., 1785–93), Griesbach was the first who dared to print the New Testament text, as he had been enabled to determine it by his critical science. The first specimen of the revised text that he published was the *Synopsis Evangeliorum* (2 vols. 1774–75; 2d ed. 1809). This was followed, in 1775–77, by an edition of the whole New Testament, which was published again in 1796–1806, and of which a re-issue was begun by D. Schulz in 1827, but has never been completed. The second edition has been twice reprinted in London, first in 1809, and again in 1818; an American edition was published at Boston in 1808. Besides smaller editions, a splendid one in 4to was published by Göschen at Leipsic in 1803–7. Griesbach's other works, *Populäre Dogmatik* (1779; 4th ed., 1789), *Commentarius Criticus in Textum N. Test.* (2 vols., 1798–1811), and the *Opuscula Academica* (2 vols., 1824–25, edited by Gabler), are now less known. A very competent authority, viz., the eminent Dr. Marsh, has pronounced Griesbach to be "the most consummate critic that ever undertook an edition of the New Testament." The grand feature of Griesbach's critical system is his threefold division or classification of the New Testament MSS. These divisions he called "recensions," or "codices." They consisted of—1. The Alexandrine recension; 2. The Latin or western recension; 3. The Byzantine or eastern recension. Griesbach endeavors to show that the early fathers, according to their locality, made use of a particular set of MSS., exhibiting certain peculiarities such as justify the above division. Griesbach expressed his decided preference for the Alexandrine recension, both in regard to antiquity and purity; the Byzantine he considered the least trustworthy. Among the most memorable of Griesbach's triumphs as a critic is his exposure of the interpolation of the well-known passage in defense of the doctrine of the Trinity, 1 John v. 7. His life has been written by Köthe (Jena, 1812); Augusti (Berl. 1812); and by Eichstädt (Jena, 1815).

GRIFFIN (Fr. *Griffon*, Lat. and Gr. *Gryps*), a chimerical creature, which the fancy of the modern has adopted from that of the ancient world. The griffin is first mentioned by Aristeas, perhaps about 560 B.C. (see Liddel and Scott's *Gr. Dic.*), though the accounts of Aristeas seem to be about as fabulous as those of the griffin. See Smith's *Dic. of Gr. and Rom. Biog.* The origin of those monstrous conceptions in general, of which the griffin is one, has already been considered under DRAGON (q.v.). The griffin is variously described and represented, but the shape in which it most frequently appears is that of an animal generated between a lion and an eagle, having the body and legs of the former, with the beak and wings of the latter. In this form it appears on antique coins, and as an ornament in classical architecture. Like all other monsters,

griffins abound in the legendary tales of the Teutonic nations, and the name in various forms, slightly differing from each other (Ger. *Greif*, Dan. *Grif*. etc.), is to be found in most Teutonic dialects. Whether in the two cases both the name and the notion might not be traceable to a common source, or whether it was through barbarian or classical channels that they found their way into the nomenclature and the practice of heralds, are subjects on which we do not venture an opinion. Certain it is, however, that there are few fabulous conceptions with which the science of heraldry is more conversant than the griffin. Nor were they regarded by the patriarchs of that science always as mere creatures of the imagination, for incredible as it may seem, we find Gerard Leigh, a herald of great reputation in the time of Elizabeth, talking of them with entire sincerity as existing animals. "I think they are of great hugeness," he says, "for *I have a claw of one of their paws*, which should show them to be as big as two lions."—See Newton's *Display of Heraldry*, p. 126. In the heraldic griffin, the claws of the eagle are usually substituted for the fore-paws of the lion. Gwillim blazons a griffin in this attitude "rampant," alleging that any fierce animal may be so blazoned as well as a lion. But the more appropriate and usual term is "segreant." In representing the griffin, the ears ought not to be omitted, as they indicate the attribute of watchfulness, which, along with strength and swiftness, went to make up the classical conception of his character. See WYVERN.

The name GRIFFIN, in natural history, is sometimes appropriated, as by Cuvier, to the genus *gypaëtos*, of which the lämmergeier (q.v.) is the best known species; whilst in France it is generally bestowed, under the slightly modified form *griffon*, on the TAWNY VULTURE (*vultur* or *gyps fulvus*), also called the griffin vulture or griffon vulture, a bird which inhabits most of the high mountainous regions of Europe, as well as those of northern and central Asia and of the n. of Africa. A specimen was caught in the s. of Ireland in 1843, the only one that is known to have ever found its own way to the British islands. The griffin vulture is more than 4 ft. in length; it is of a yellowish-brown color, with darker quills and tail; the head and upper part of the neck covered with short white down, the lower part of the neck surrounded with a ruff of long slender white down. Its habits are very much those common to vultures in general.

GRIFFIN, CHARLES, b. Ohio, 1826; graduated at West Point; served in the Mexican army and on frontier duty. He became a capt. in 1861, and was at the first battle of Bull Run; rose through various grades to brevet maj.gen. of volunteers, and after the war was appointed col. of the 35th infantry in the regular army. He was one of the commissioners to carry out the terms of Lee's surrender, being at that time in command of the 5th corps.

GRIFFIN, CYRUS, 1749–1810; b. Va.; was in the legislature, and in the colonial congress two terms, presiding over that body in 1788. From 1789 he was judge of the United States district court for Virginia.

GRIFFIN, EDWARD DORR, D.D., 1770–1837; b. Conn.; graduated at Yale, and was pastor of a Congregational church in 1795; afterwards pastor in New Jersey; in 1808 professor of sacred rhetoric at Andover, and in 1811 pastor in Boston, where he published the *Park Street Lectures*, an exposition of the doctrines taught by John Calvin. In 1821 he was chosen president of Williams college, where he remained until 1836. He published a number of works.

GRIFFIN, GERALD JOSEPH, 1803–40; b. Ireland; at the age of 20 went to London to undertake a literary career, taking along a play for which he found no market. He then sent prose articles and poems to the newspapers and magazines, and soon began to be favorably known as a promising author. Among his works are *Tales of Munster Festivals; The Colleen Bawn; The Invasion; The Duke of Monmouth; The Rivals;* and many poems.

GRIFFIS, WILLIAM ELLIOT, b. Philadelphia, 1843; a clergyman of the Reformed church, a traveler and educator in Japan. When 22 years of age he turned from business life and entered Rutgers college, graduating 1869. After traveling in Europe he studied one year at the theological seminary at New Brunswick, N. J.; then accepted appointment to organize schools on the American model in Japan, and was the first American teacher in regions beyond the open ports. On the fall of the feudal system, and the unification of the empire, he was appointed professor of the physical sciences in the imperial university of Tokio. He prepared the *New Japan Series* of reading and spelling books and primers for Japanese students of the English language, and contributed to the Japanese press and to newspapers and magazines in the United States numerous papers of importance on Japanese affairs. Returning to New York, 1874, he finished his theological studies at the Union theological seminary; and, in 1877, became pastor of the Reformed church, Schenectady, N. Y. He is the author of *The Mikado's Empire;* also of a collection of the fairy tales and folk lore of the Japanese, and of a *History of Corea.*

GRIFFITH, WILLIAM, 1810–45; b. England; educated at London university; and was assistant surgeon in India. He took much interest in botanical studies, and made large and valuable collections of plants. His name has been attached to a genus of rubiaceous plants.

GRIGORIO'POL, a t. of South Russia, in the government of Kherson, on the left bank of the Dniester, 78 m. n.w. from Odessa. It is a fortified town, and regularly built, is inhabited chiefly by Armenians, and has manufactures of silk and cotton stuffs. Its Armenian inhabitants have received large grants of land in the vicinity, but neglect its cultivation, and are chiefly occupied in commercial pursuits. Pop. '67, 6,608.

GRILLPARZER, FRANZ, an Austrian dramatic poet, was b. at Vienna, Jan. 15, 1790, and first attracted the notice of the public in 1816 by a tragedy, entitled *Die Ahnfrau* (The Grandmother). In 1819 appeared *Sappho*, and in 1822 *Das Goldene Vliesz* (The Golden Fleece), which, although they had not much success on the stage, were highly admired as literary productions. The most important of his subsequent works are *König Ottokar's Glück und Ende* (King Ottokar's Fortune and End, 1825), a tragedy regarded by some as in many respects his most masterly piece; *Melusina* (Vienna, 1833); *Des Meeres und der Liebe Wellen* (The Waves of Love and of the Sea, 1840), founded on the story of Hero and Leander, and remarkable not only for its particular beauties, but also for the unusual delicacy and simplicity of spirit characterizing it as a whole; and *Der Traum im Leben* (The Dream of Life, 1840), a richly poetical drama. Grillparzer also wrote some comedies, and several very beautiful lyric poems, which betray a half-suppressed but genuine love of liberty. He died in Jan., 1872.

GRILSE. See SALMON.

GRIMALDI, an ancient and noble family of Genoa, who were princes of Monaco from the 10th to the 17th century. The most eminent of the Grimaldis were: 1. RANIERD, who commanded a fleet in the service of Philip the fair (of France) in 1304, defeating and making prisoner Guy of Flanders. 2. ANTONIO, distinguished in naval warfare in the early part of the 14th century. He was successful over the Aragonese and Catalonians until 1353, when they nearly destroyed his fleet. 3. GIOVANNI, another naval commander, who defeated Trevesani, the Venetian admiral on the Po, taking 28 galleys, a whole fleet of transports, and much other spoil. 4. DOMENICO, like the others distinguished at sea, especially in the battle of Lepanto. He was also a cardinal and vice-legate of the Avignon, noted for his efforts to exterminate heresy. 5. GERONIMO, 1579–1685; was a cardinal, and made great efforts to reform the manners of the clergy. He founded a hospital for the poor, and distributed in alms 100,000 livres a year.

GRIMES, a co. in e. central Texas on the Navosota and Brazos rivers, reached by the Houston and Texas Central railroad; 902 sq.m.; pop. '70, 13,218—7,921 colored. It is mostly level, and a large portion is covered by forests. Soil good. Chief productions: cotton, corn, cattle, and pork. Co. seat, Anderson.

GRIMES, JAMES WILSON, LL.D., 1816–72; b. N. H., graduated at Dartmouth, and followed the legal profession. He settled in Iowa, was in the territorial and state legislature, and in 1854 was elected governor. In 1859 he was U. S. senator, being re-elected in 1865. At the beginning of the war of the rebellion he was the originator of the first act of emancipation by inducing the president to set free a number of fugitive slaves who had been put in jail in Washington.

GRIMKÉ, ANGELINA, 1805–79; b. Charleston, S. C.; an American abolitionist, youngest daughter of judge Grimké, and sister of Thomas S. Grimké, the distinguished opponent of nullification in 1830–31. Belonging to a family of the highest social rank, and born in one of the strongholds of slavery, she saw in her earliest childhood the cruel wrongfulness of the system; and in the earliest years of ripening womanhood, with all the charm that beauty, intelligence, and family distinction could give, she tore herself from home and friendships and became an exile among strangers, in order that she might more effectually plead the cause of the slaves. As a child she was shocked by the cruelties to which the slaves were exposed, and she would sometimes steal out of the house in the darkness, with her bottle of oil and other simple medicaments, and do what she could to alleviate the sufferings of some poor creature who had been terribly whipped. At an early age she united with the Presbyterian church, and her religious experiences served to intensify her hostility to slavery. Every effort was made to overcome what were regarded as merely her childish and fanatical scruples. When she was 16 years of age her mother gave her a slave girl to be her waiting-maid. "You are to have her as your property," said the mother. But Angelina said firmly, "I cannot have a slave. The girl belongs to herself, not to me. Besides, I don't need to be waited on; I can wait on myself." No persuasion could induce her to become a slaveholder. As a teacher in a Sunday-school, she could not fail to see the contrast between the privileges of instruction enjoyed by her pupils and the deprivations of the slaves, whom she could not even teach to spell the name of God without breaking the law. Finding that moral instruction was not prohibited, she besought her mother for permission to call the slaves of the household every morning for social worship. When they were assembled the young girl read to them the words of Christ, spoke to them tenderly of the simple truths of the gospel, and then knelt and prayed with them. Such was her daily practice so long as she remained under the paternal roof. She endeavored to impress upon the officers of the church a sense of what they should do for the slaves, but her pleadings found no response. Through an elder sister in Philadelphia she heard of the Quakers and their opposition to slavery. She read their books and was charmed, and finding that there

were in Charleston two aged Friends who met every Sunday for worship, she discarded her fashionable attire, put on the simple Quaker garb, and for a whole year afterwards, when the family carriage rolled away on Sunday morning to St. Philip's, walked alone to the Friends' meeting-house, and sat down with these two aged Friends under a canopy of silence, where no word was ever spoken. This was while there was yet no public movement against slavery; she was following her own heartfelt convictions and longing for further light. News of Garrison's imprisonment in Baltimore reached her, carrying with it, however, a weight of opprobrium upon his name. What could she do? She was convinced that it was impossible for one in the midst of slavery to act effectually against it. Self-exile seemed the only alternative. The thought of this brought peace. Her sister in Philadelphia had united with the Quakers; she would join her and find in the free north her home and her work. In the fall of 1830 she left all, never to return. The rising anti-slavery movement at once enlisted her sympathy, but how to give it any help she did not at first see. At length light dawned upon her, and she was impelled to prepare an *Appeal to Christian Women of the South*. She timidly submitted the manuscript to the executive committee of the American anti-slavery society, by whom it was read with wet eyes. It was published and sent in large quantities to the south. In Charleston it created a strong excitement, and, with other publications of the same character, formed a pretext for breaking open the post-office and making a bonfire in the public square. Not long after this it was understood in Charleston, that she intended to visit her mother and sister and pass the winter with them. Thereupon the mayor called upon her mother, and desired her to inform her daughter that the police had been instructed to prevent her landing, and that, if she should elude their vigilance, and go ashore, she would be arrested and imprisoned. When these threats were communicated to her, she replied that she knew she could not go to Charleston without compromising and distressing her family, but, were it not for this fact, she would certainly exercise her constitutional right as an American citizen to visit her relatives, submitting willingly to any pains and penalties that might be inflicted upon her, believing as she did that any violence she might be called upon to suffer would serve to reveal the true nature of slavery and intensify the opposition to it in the free states. Remaining in Philadelphia, and acting in co-operation with her sister, she was exerting a strong private social influence in favor of the anti-slavery cause. As yet she had not lifted up her voice in public, nor addressed any private assembly of women, nor in any other way transcended the conventional rules by which the activity of women was limited. But now came an invitation to her from the American anti-slavery society to go to New York for the purpose of meeting women in private parlors and laying before them her experiences as a southern woman, and pleading with them to lend their influence for the overthrow of slavery. She said, "I feel this to be God's call," and resolved at once to obey it. Her sister, Sarah Moore Grimké, 13 years older than herself, who was in full sympathy with her in her opposition to slavery, concluded to join her, and together they went to New York in Nov., 1836. The society had offered them a modest salary, which they declined, preferring to labor at their own cost. Their visit made no small stir in a city already much excited upon the slavery question. Many private parlors were opened to them and crowded by women eager to listen and to learn. Their addresses made a profound impression upon all who heard them. Angelina especially disclosed remarkable power as a speaker, and the traditions of her eloquence have survived the overthrow of slavery. Parlors becoming too small for the crowds that desired to attend, vestries and halls were substituted, and at last it was found necessary to open a large church, which in turn overflowed with the multitudes of women who thronged to see and hear. The fame of the sisters was widespread, and in 1837 they were called to Massachusetts, where for a time they continued to speak to women only; but so exciting were the reports of Angelina's eloquence that at length the barriers were broken down and men as well as women thronged their meetings. The lady speakers were by no means displeased on this account, for as Quakers they were as willing to address the one sex as the other. The excitement which had attended their labors was now mightily increased, a strong opposition to their course was developed, the "woman question" was discussed on every side, dividing the abolitionists into two hostile camps, and for a time Massachusetts, and indeed all New England, was deeply agitated. Here began the modern movement for enlarging the sphere of woman's opportunities and activities which has borne so many fruits already and is still an absorbing theme of discussion. The South Carolina ladies welcomed the discussion, but did not suffer themselves to be drawn aside from their special work. Angelina especially was in wide demand. Night after night she spoke to crowds that filled the old Boston theater to its utmost capacity. Her audiences were composed of people of intelligence and culture, and her thrilling appeals did much to modify the prevailing pro-slavery sentiment of the times. A committee of the Massachusetts legislature invited her to address them in the hall of representatives, where she was heard with close attention and deep respect by eminent citizens from every part of the state. In all these labors, according to the testimony of those who witnessed them, she never lost one of her purely feminine qualities. Graceful, gentle, retiring, she won universal respect and admiration. In May, 1838, she was married to Theodore D. Weld. It was far from her expectation that her public labors were now ended; but early in her married life she was twice severely injured, and thereby incapacitated

for further public speaking. Her husband founded a school, to which for many years she gave her attention as her health permitted. Her sister went with her into retirement, and was also engaged in Mr. Weld's school. They still maintained their interest in the anti-slavery cause, and both of them lived to rejoice in its complete triumph. Sarah died at Hyde Park, Mass., 1873; Angelina, 1879.

GRIMKÉ, FREDERICK, 1791–1863; brother of Thomas, b. S .C. He settled in Ohio, where he was for a long time judge of common pleas and of the supreme court. He published *The Nature and Tendency of Free Institutions*, and an essay *On Ancient and Modern Literature*.

GRIMKÉ, THOMAS SMITH, LL.D, 1786–1834; b. S. C., graduated at Yale, and studied law. He was active in political life, and vigorously opposed South Carolina's nullification projects. He was a thorough scholar, and the author of a number of addresses on science, education, and literature. He was one of the early advocates of peace and a promoter of the American peace society. One of his hobbies was a reform in the spelling of the English language, but he was too far ahead of the age to get a hearing.

GRIMM, FREDERICH MELCHIOR, Baron, an eminent critic of the last c., who, during his long residence in Paris, was on terms of intimacy with the most celebrated personages of the day, was b. at Regensburg, Dec. 25, 1723. Having completed his studies, he accompanied the young count de Schönberg to the university at Leipsic, and afterwards to Paris. Here he became reader to the crown-prince of Saxe-Gotha, but the situation proved more honorable than remunerative, and Grimm was in very straitened circumstances when he became acquainted with Rousseau. The latter introduced him to Diderot, baron Holbach, Madame d'Epinay, and other persons distinguished by birth and talents, and he soon became a general favorite. His connection with the encyclopædists (q.v.), and his multifarious acquirements and versatility of mind soon opened to him a brilliant career. He became secretary to the duke of Orleans, and now began to write his literary bulletins for several German princes, containing the ablest analysis of all the most important French works. In the composition of these notices, he is believed to have been assisted by the Abbé Raynal and Diderot. In 1776 he was raised by the duke of Gotha to the rank of baron, and appointed minister-plenipotentiary at the French court. On the breaking out of the revolution, he withdrew to Gotha, and in 1795 the empress of Russia appointed him her minister-plenipotentiary at Hamburg, a post which he retained till ill-health obliged him to relinquish it. He returned to Gotha, where he died Dec. 19, 1807. His *Correspondance Littéraire, Philosophique et Critique*, was published after his death in 16 vols. A supplement to this is the *Correspondance inédite de Grimm et Diderot* (Paris, 1829). It contains a complete history of French literature from 1753 to 1790, and is remarkable for its brilliant and piquant criticism.

GRIMM, JAKOB LUDWIG, German philologist and antiquary, was b. Jan. 4, 1785, at Hanau, in Hesse Cassel. He was educated in classical and legal studies at Marburg, and afterwarwards visited Paris, where he pursued a variety of studies, and assiduously cultivated his taste for mediæval literature. On his return to Germany he was appointed secretary to the minister of war at Hesse Cassel, and became successively librarian of Willelmshöhe, and auditor to the council of state. In 1814 he was secretary to the ambassador of the elector of Hesse, whom he attended at Paris, and at the congress of Vienna. In 1815 he was appointed a commissioner by the Prussian government to claim the restoration of valuable manuscripts, which had been removed to Paris by the armies of Napoleon I. In 1830 he received the appointment of professor of German literature, and librarian of the university of Göttingen. In this position he devoted seven years to the study of the language, ancient laws, history, and literature of Germany. He was one of seven professors who protested in 1837 against the abolition of the constitution by the king of Hanover, for which act he was outlawed, and obliged to retire to Cassel. In 1841 he was invited to Berlin, where as a member of the academy he was entitled to give lectures. He sat as a member of the assembly of Frankfort in 1848. Though holding at various times important public offices, his life was devoted to philological and antiquarian studies, and to works which are mines of erudition, and the results of a wonderful industry combined with excessive enthusiasm for everything German. His German *Grammar*, in four volumes, the first volume of which was published in 1819, and the last in 1837, is perhaps the greatest philological work of the age; it may be said to have laid the foundation of the *historical* investigation of language. It traces the German language through all its dialects. Some idea of its thoroughness may be got from the fact that the vowels and consonants alone occupy 600 pages. His *Deutsche Rechts-Alterthümer* (antiquities of German law published 1828), and *Deutsche Mythologie* (German Mythology, 1835), are exhaustive works upon the society of the middle ages in central Europe, and the religious traditions and superstitions from the earliest times. His *Geschichte der Deutschen Sprache* (History of German Language), and *Ueber den Ursprung der Sprache* (On the Origin of Language), are also works of great importance. In company with his brother Wilhelm he published numerous works of a more popular character, the best known of which is *Kinder und Hausmärchen* (Nursery and Fireside Stories). The greatest joint undertaking of

the two brothers (now carried on by other scholars) is the *Deutsches Wörterbuch*, begun in 1852, and yet far from completion. Jakob Grimm died Sept., 1863.

GRIMM, WILHELM KARL, brother of the preceding, was b. at Hanau, Feb. 24, 1786. He was the companion of his elder brother at the lyceum of Cassel, and the university of Marburg. In 1814 he was secretary of the librarian of Cassel, and on removing to Göttingen, in 1830, was appointed under-librarian and supernumerary professor of philosophy. He joined his brother in the protest against the king of Hanover, shared his exile, and also his call to Berlin. They labored together, and were commonly known as the Brothers Grimm. Wilhelm Grimm died Dec., 1859. Among the works of the younger Grimm are—*Translations of Ancient Danish Heroic Poems of the Sixth Century; German Runic Characters; Heroic Legends of Germany*, etc.

GRI'MMA, a small t. of Saxony, in the circle of Leipsic, and 18 m. s.e. of the t. of that name, is attractively situated in a hollow on the left bank of the Mulde. In the middle ages its importance as a trading town was much greater than at present, and the flourishing manufactures in cloth, flannels, hosiery, cottons, and linens, for which at an early period of its history this town was noted, have now almost entirely disappeared. Among the public buildings are the royal castle, now used as a court-house, and the ancient town-hall. Pop. '75, 7,273, who support themselves by manufactures and agriculture.

GRIMM'S LAW, the name—derived from the discoverer, J. Grimm (q.v.)—given to the principle which regulates the interchange of the mute consonants in the corresponding words of the different Aryan languages. A historical survey of this family of tongues shows the consonants to go through a cycle of changes (Ger. *Lautverschiebung*). What, for example, was a *p* in the original form of a word, or, at least, in the oldest form known, is found at a later stage transformed into *f*, which next passes into *b;* and this again tends to become *p*, and go through the cycle anew. The following table exhibits the transitions that manifest themselves in regard to the Greek, Gothic, and old high German:

	Labials.			Dentals.			Gutturals.		
Greek (Latin, Sanscrit),..	p	b	f	t	d	th	k	g	ch
Gothic,.....	f	p	b	th	t	d		k	g
Old High German,.....	b (v)	f	p	d	z	t	g	ch	k

There are of course many exceptions, arising from the influence of adjoining letters and other accidental causes. The following are exambles of the law:

Sanscrit.	Greek.	Latin.	Gothic.	Old High. German.
pâda-s	pod-os	pedis	fôtus	vuoz
pitrî	pater	pater	fadrein (pl.)	vatar
bhri	phero	fero	baira	piru
tvam	tu	tu	thu	du
trayas	treis	tres	threis	drî
paçu	poû	pecus	faihu	vihu

It is in the high German dialects that the action of this principle is most marked. In the Teutonic tongues of the "low" type, of which English is one, the consonants have remained at the same stage of development they had attained in the Gothic (e.g. Eng. *father, foot, bear, three*); the old high German exhibits a third stage; and in modern high German the principle seems still at work, although its development is hindered by the crystallizing effect of written language.

GRI'MSBY, GREAT, a parliamentary and municipal borough, seaport, and market-town of England, in the co. of Lincoln, is situated on the right bank of the Humber, 40 m. n.e. of the t. of Lincoln. It consists of two portions—the older, comprising a number of streets irregularly laid out, it is at the head of the harbor; and the newer part, called the "Marsh," extends along the e. side of the harbor, and is regular and spacious. The parish church, a good specimen of the English pointed style, is an elegant cruciform structure, with a tower containing eight bells rising from the center. Among its institutions Grimsby has a free grammar-school, a national school, and other educational establishments; a mechanics' institute and a new town-hall. There are here an extensive and commodious suite of docks, opened in Mar., 1852, and spacious enough to receive the largest ships of war; several ship-building yards, mills, and a tanyard and brewery. Grimsby, however, is now chiefly famous for its immense fishing trade. In 1875, 2,543 vessels, of 438,520 tons, entered, and 2,071, of 508,898 tons, cleared the port. The commerce of Grimsby is benefited by its being the terminus of the Great Northern, and of the Manchester, Sheffield, and Lincolnshire railways. It sends one member to the house of commons. Pop. in '71, of the municipal borough, 20,244; of the parliamentary borough, 26,982.

Grimsby was formerly a port of such importance that, in the reign of Edward III., it sent 11 ships to aid that monarch in his expedition against Calais. But the gradual silting up of the harbor reduced it to comparative insignificance. Its present prosperity may be said to date from the beginning of this century, when measures were first taken to improve the harbor.

GRINDAL, EDMUND, 1519–83; an English prelate, private chaplain to bishop Ridley, and chaplain to king Edward VI. When Mary came into power he went to the continent and remained until her death. On returning he was one of the makers of a new liturgy, and one of seven ministers chosen to oppose the Roman Catholics in open discussion. He was bishop of London, succeeding Bonner, and afterwards bishop of York. In 1575 he was made archbishop of Canterbury. He became blind in 1582.

GRIN'DELWALD, one of the most beautiful of the high Alpine valleys, at a distance of 35 m. from the city of Bern, is about 12 m. long and 4 m. broad. Grindelwald owes its celebrity as a resort for travelers to two great glaciers, branches or arms, as it were, of the immense ocean of ice which covers the Bernese Oberland. The village of Grindelwald, consisting of a number of widely-scattered cottages, with about 3,500 inhabitants, is about 3,600 ft. above sea-level.

GRINDING, the operation of shaping any hard substance by rubbing away its surface with a rough stone or with a cutting powder. It is similar to filing, and is used in cases where, from the hardness of the material, or for other reasons, filing is inapplicable. Thus cutting-tools and other steel instruments may be filed before hardening and tempering; but after this, if further abrasion is required, they must be ground. Glass lenses and metal specula are ground to shape with emery-powder laid upon a metal tool. Ornamental glass is ground into facets or otherwise by means of stones and lap-wheels. Diamonds and other gems are ground or cut with diamond-dust imbedded in soft iron. When large flat surfaces are required, they are obtained by first working two pieces of the substance nearly flat, and then laying one upon the other, and grinding their surfaces together with sand, emery, or other suitable cutting powder. Plate-glass is flattened in this manner; also surfaces of cast-iron where accurate fitting is required, the iron surface being either prepared with a planing-machine, or by turning in a lathe with a slide-rest. Sockets and other bearings which require to be fitted with great accuracy are usually finished by grinding together. For brass and bell metal powdered pumice-stone is best adapted for such purposes, as emery is liable to imbed itself in the metal, and give it a permanent cutting action upon the bearings.

Dry grinding is the term applied to the grinding of steel with dry grindstones. Its principal applications are in the grinding of the points of needles and forks, the surfaces of gun-barrels, and in finishing steel-pens. This kind of work produces painful irritation in the throat and nostrils of the men and women who follow it; and although the distressing effects have been very much diminished of late by the introduction of currents of air to carry away the particles of steel, and mouth-pieces of damp cloth, the evil is not entirely obviated; in some branches, such as gun-barrel grinding, it is still very great. Besides this evil, the stones used for gun-barrel grinding, which are very large, revolve with great rapidity, and occasionally break with great force while revolving, and seriously endanger the lives of the men.

Another kind of grinding, quite distinct from the above, is that of crushing and rubbing a substance into a fine powder. This is effected by passing the substance between rough stones, as in the common flour-mill, or between rollers, either smooth or toothed, according to the degree of fineness required, or by a heavy stone or iron cylinder revolving upon a smooth plate. Colors are ground in small quantities with a *muller and slab*. The muller is a heavy piece of stone of somewhat conical shape, and which rests on its base upon the slab of stone, and is grasped by the hands, and the color is mixed to a pasty consistence with the required medium of oil or water, and rubbed between the two surfaces until smooth and impalpable. On a larger scale iron or stone cylinders revolve on a slab in such a manner that they shall not merely roll but shall also rub upon the surface of the slab. A knife or scoop follows one cylinder and precedes the other, scooping the paste into the position required to come fairly under the cylinder which follows it. Chocolate, spices, plumbago for crucibles, and a variety of other substances, are ground in this manner.

GRINDING AND CRUSHING MACHINERY. Most of the improvements in grinding and crushing machines have been made within the last 30 years, particularly as relates to crushing and breaking. Until the development of the gold fields of California subsequent to the year 1849, in which was the commencement of the great migration thither, the breaking of stones and ore was performed usually by hand, with a sledge, in connection with blasting. The first machine on the Pacific coast consisted of immense weights, raised by cams to a height of 4 or 5 ft., and let fall upon the rock. A machine having a weight of one ton had a capacity of breaking one ton of quartz rock an hour. There was no mortar or trough, but the rock was placed on the face of an anvil, around which there was a grating through which fell all the pieces broken sufficiently fine. Coarser pieces could be replaced upon the anvil. A machine more easily worked, and very effective, was invented by Mr. Eli Whitney Blake, of New Haven, Conn. A very heavy, stationary, vertical plate forms one side of a wedge-shaped hopper, which is at the same time the crushing chamber. The other side of the hopper is formed by a movable jaw which turns upon a pivot at the upper end, the lower end coming as near the stationary piece as the required size of the fragments. This jaw is moved backwards and forwards through the space of about one quarter of an inch, by means of a toggle joint which is moved by a wheel. A rubber spring aids in draw-

ing the jaws apart suddenly, thus facilitating the descent of the rocks in the wedge-shaped hopper. The product of crushed matter varies with the different sizes from 3 to 7 cubic yards per hour, the horse-power varying from 4 to 12. Hall's breaker is a modification of Blake's, the movable jaw consisting of two pieces which play alternately. For further notice of rock-crushing machinery, see METALLURGY, and for sugar-cane crushing-machines, see SUGAR. In the article MILL there is a description of grind-stones and machinery for making flour. There are various other forms of mills for other purposes, such as the crushing of seeds and bark, and grinding of paints. Very powerful mills are required in the preparation of vulcanized India-rubber (caoutchouc). The crude India-rubber, after being boiled and softened in a steam vat, is passed between two fluted rollers of very great strength, by which it is ground to a sort of paste. A kind of mill used for crushing seeds, grinding chocolate, mixing mortar, etc., consists of two vertical wheels turning independently upon the ends of an axle, which also turns upon a vertical pivot midway between the two wheels. A circular bed or vat, having a rim of greater or less height, receives the article to be ground, over which the wheels or rollers are made to revolve. One of the most ingenious, simple, and effective mills in use was the invention of Mr. James Bogardus, of New York city. Two wheels, having on their faces concentric grooves, have different axes of revolution, being eccentric, a name given to the mill. The wheels are placed horizontally, and the lower one is turned by a shaft at the rate of from 600 to 800 revolutions per minute. The upper wheel also takes on a motion from the impulse of material brought against it, but being eccentric, the material is brought diagonally against the edges of the groove, making the grinding very effective and preventing clogging. Over 200 barrels of sugar have been ground per hour in a 16-in. mill. It will grind 5 tons of oil-cake, half a ton of bark, two tons of white lead in oil, four tons of iron-ore, and two tons of any ores per hour. It is very strong and not easily disordered.

GRINDSTONES. Flat circular stones made to revolve upon an axis, and used for grinding steel, glass, other stones, etc. They are made of sandstone, or sandstone grit, of various degrees of coarseness, according to the purpose for which they are to be used.

GRINDSTONES (*ante*) are mounted more or less simply, from the stone disk fixed on a horizontal spindle carried on the tops of two posts rudely set in the ground, with a winch handle, or crank and treadle, to the large stones employed in cutlery manufactories, turned by machinery at a speed as great as practicable without bursting the stone by the centrifugal force. Grindstones are commonly made of sandstone, of which, suitable for the purpose, there are quarries in the northern coal districts and the midland counties of England, and in Nova Scotia. Some of the best grindstones in the United States are brought from Berea, Ohio. Artificial grindstones of very uniform and perfect texture are made with emery (q.v.), in great variety of size and form, adapted to various uses; and are much used for work on metal surfaces, dispensing with slow and laborious hand-filing. Emery-wheels are made as large as 3 ft. in diameter, and so strong that they can be driven at 6,000 ft. per minute, when they will readily cut tempered steel. They wear very slowly, and when properly used keep themselves true. If a true surface is lost it can be restored only with a diamond, that alone being hard enough for the purpose.

GRINNELL, a village in Poweshiek co., Iowa, on the Central Iowa railroad, 55 m. e. of Des Moines; pop. 1,480. It is the seat of Iowa college (Congregational) founded in 1848. There is considerable manufacturing business in the village.

GRINNELL, HENRY, 1799–1874, brother of Moses H., and a partner in the great commercial house of Grinnell, Minturn & Co., New York. Having amassed a considerable fortune by his skill and success as a merchant, Mr. Grinnell devoted the latter part of his life to the extension of geographical knowledge, mainly in connection with the arctic regions. In 1850 he undertook the expense of fitting out an expedition in search of information concerning the ill-fated Franklin and Crozier expedition of 1845. The expedition comprised two vessels, and was commanded by lieut. De Haven, U.S.N. Unsuccessful in the immediate object of their search, the explorers were fortunate enough to make important additions to existing geographical knowledge of the polar regions. They discovered the extensive tract of land divided by Smith's Sound from Greenland, and named "Grinnell Land" after the enterprising and munificent New York merchant. This discovery brought about a sharp controversy with English geographers and explorers as to priority, which was finally concluded in favor of the American expedition, and the name "Grinnell Land" affixed permanently in place of that of "Prince Albert Land," which had been given it by the British. In 1853 Mr. Grinnell, with the aid of Mr. George Peabody, fitted out for a second expedition, the brig *Advance* commanded by Dr. Elisha Kent Kane, who had sailed as surgeon and naturalist with De Haven. This expedition doubtless accomplished more than any which had preceded it, having first definite evidence of the existence of an open polar sea, and defined the coast-line, and explored the interior of hitherto unknown lands. See KANE, E. K. Mr. Grinnell was the first president of the American geographical society, and his name and services are held in high respect both in America and England, and in the latter country, his liberal example induced such energy and enter-

prise as eventually resulted in clearing up the long mooted question of the fate of the Franklin expedition.

GRINNELL, Moses H., 1803–77; b. Mass.; an eminent New York merchant, the head of the firm of Grinnell, Minturn & Co. He was a representative in congress in 1839–41; and in 1869–71 collector of customs at New York.

GRINNELL LAND, the most northerly land of the American continent so far as discovered. It is separated from Greenland by Kennedy's channel. Lieut. De Haven, who commanded the ships sent out by Henry Grinnell from New York in 1850, claimed to have been the first discoverer, but the English also make their claim. In 1871 capt. Hall examined the e. coast as far up as 82° 16′, a few miles above which point the shore appeared to incline westward. This land is nearer to the pole than any other now known; the n. limits of Greenland have not been explored.

GRIPING, or Gripes, a popular name for all painful affections of the bowels, whether attended with constipation (q.v.) or diarrhea (q.v.). When pains of this kind are spasmodic, they are termed colic (q.v.) The action of purgative medicine is often attended by more or less of griping pain, which may be averted in certain cases by the careful choice of the medicine, or by combination of it with carminatives (q.v.), or with a little opium.

GRIPPE, a French name for influenza (q.v.).

GRI'QUALAND, a tract of country in s. Africa, to the n.e. of Cape Colony, lying about the junction of the Orange and Vaal rivers to the w. of the Orange River Free State. It derives its name from its inhabitants, the Griquas or Bastaards, a race sprung from the intercourse of Dutch settlers with Hottentot and Bush women. The area and population are uncertain. Some of the inhabitants are successful farmers, and there is a thriving settlement, Griqua Town, under the care of the London missionary society.—*Griqualand West* has of late years become famous from the discovery of the Cape diamond-fields, which are situated within its bounds. The first diamond was found in 1867, and for several years a strong tide of immigration flowed unceasingly. Various settlements were formed; digging was vigorously prosecuted; and all nationalities were represented. The territory in which the diamond-fields lie had been secured to a native chief, Waterboer, by the British government; but both the Orange River Free State, and the Transvaal Republic contested his boundaries, and the result was constant disturbances at the diggings. At length, in Oct., 1871, the British government of Cape Town issued a proclamation declaring Griqualand West British territory, and annexing it to Cape Colony. This was done with the assent of Waterboer, whose interests were not neglected. The principal settlements are Du Toit's Pan and De Beer. Pop. '72, 25,477; area about 17,800 sq.miles.—*Griqualand East* was incorporated with Cape Colony in 1874.

GRIQUAS, or Bastaards, people of s. Africa who are the offspring of native women by Dutch settlers. There are probably 15,000 of them on Orange river near the n. limit of Cape Colony. Some of them are partially civilized, and a considerable number are counted as Christians. There is a thriving settlement at Griqua Town, about 500 m. n.e. of Cape Town. Their chiefs are chosen by suffrage, and there are among them many prosperous farmers and cattle breeders.

GRISCOM, John, ll.d., 1774–1852; b. N. J.; studied in a Quaker academy, and at 17 began to teach. He was a teacher in New York for a quarter of a century. He made a tour in Europe to inspect institutions of charity, reform, and education, including manufactories, publishing his observations in *A Year in Europe*. The New York high school, forerunner of the free academy and the normal college (now the college of New York) was projected and for six years supervised by him. He was also one of the founders and secretary of a society for the prevention of pauperism. His latest work was the reform of the school system of New Jersey.

GRISCOM, John Hoskins, 1809–74; b. New York, son of John, the teacher. He was educated in medicine at Rutgers college, and Pennsylvania university, and for many years practiced in New York, being professor of chemistry in the college of pharmacy, and 24 years physician to the city hospital. He was also an active member of the prison association. Among his works are *Animal Mechanism and Physiology; Uses and Abuses of Air and Means for the Ventilation of Buildings; First Lessons in Physiology with Brief Rules for Health; Sanitary Legislation, Past, Present, and Future*, etc.

GRISE'LDA, or **GRISELDIS**, is the heroine of a celebrated mediæval tale, which probably had its rise in Italy. A poor girl, who was a charcoal-burner, was raised to be the wife of the marquis of Saluzzo, who put her humility and obedience to the severest tests. She, however, passed through them all triumphantly, and a reconciliation took place. In this legend the endurance and self-renunciation of the loving woman are represented as carried to the highest pitch. We find the tradition first worked up into a tale, said to be founded on fact, in Boccaccio's *Decameron;* Petrarch translated it into Latin in 1373, under the title *De Obedientia, et Fide Uxoria;* and in the 14th c. the story was well-known throughout Germany. In the year 1393 it was worked up into a "mystery" play in Paris; in England the drama of *The Patient Grissel*

appeared in 1599, and one on the same subject by Hans Sachs in Germany in 1546. Versions of the story are also found in the literatures of Holland, Bohemia, Sweden, Iceland, etc. The old German people's book, entitled *Markgraf Walther*, has lately been reproduced with more or less fidelity in Schwab's *Buch der Schönsten Geschichten und Sagen*, Marbach's *Volksbücher*, and Simrock's *Deutschen Volksbücher*.

GRI'SI, GIULIA, a celebrated vocalist, was b. at Milan in 1810. From a very early period she evinced the most remarkable musical genius, accompanied by a voice of the rarest promise. At the age of 16 she first appeared in the opera of *Zelmira*, at Bologna, and gathered her earliest laurels by the inimitable quality, melodiousness, and fidelity of her voice, as well as by her pathetic and lifelike impersonation of the rôle. Two years later, she appeared at Florence, and to no artist was pre-eminenee ever more unanimously accorded. Her greatest triumph, however, was obtained at La Scala, Milan, where she played the part of Norma in the tragic opera of that name. So thoroughly did she identify herself with this character, that hardly any subsequent singer has ventured on an original and independent personation. Grisi's début at Paris in 1832 was equally successful, and overcame the proverbial cynical apathy of the frequenters of the théâter Italien. London, however, was the scene of her grandest performances, and most appreciating audiences. Grisi was twice married, first, unhappily, to Mons. Gérard de Melcy, and secondly, to Signor Mario, the eminent tenor. She died in 1869.

GRIS-NEZ, or **GRINEZ,** CAPE, a headland of France, in the department of Pas-de-Calais, opposite Dover, is the point of land nearest to the English shore, the distance being barely 21 miles. Cape Gris-nez is about equally distant from Calias on the n.e., and Boulogne on the south. It is surmounted with a light-house, the lat. of which is 50° 52′ n., and the long. 1° 35′ east.

GRI'SONS (Ger. *Graubünden*), the largest and the most thinly peopled of all the cantons of Switzerland, is bounded on the n. by St. Glarus, St. Gall, and the Vorarlberg; on the e. by the Tyrol; on the s. by Lombardy; and on the w. by Uri and Ticino. Its area is 2,770 sq.m.; its population 1877, 92,106, of whom about 40,000 are Catholics. The canton divides itself naturally into three great valley-districts, of which the first and most important lies along the course of the Rhine, and stretches northward, occupying nearly the whole of the western portion of the canton; and the second, forming the Engadine (q.v.), extends n.e. along the course of the Inn. The third valley-district comprises several smaller valleys whose streams run southward, belonging to the basins of the Ticino and the Adda. The whole canton is an assemblage of mountains intersected by narrow valleys. The climate is very varied, in some districts winter reigns for nearly eight months, while some of the southern valleys resemble Italy. In the colder districts, scanty crops of barley and rye are raised with difficulty; while in the southern valleys, wheat, maize, and also the vine, fig, and almond are successfully cultivated. Pastures and forests occupy a large portion of the canton; and cattle, timber, and cheese are the principal exports. Iron, lead, copper, zinc, and silver are worked. The rivers abound in salmon and trout, and in the mountains are bears, wolves, lynxes, and wild-cats.

The country was anciently inhabited by the Rhætii, who are by some connected with the Etruscans (see ETRURIA). It was conquered by the Roman emperor Constantius in the 4th c., and his camp (*Curia, Chur, Coire*, the name of the present capital) was planted on the Rhine. Chur has been a bishopric since 450 A.D. In the 10th c. the country of the Grisons was added to the German empire, and remained till 1268 subject to the Swabian dukes. With the decay of the imperial authority it came to be oppressed by a numerous nobility, the ruins of whose castles still crown the heights. Against them the people began, in the end of the 14th c., to form leagues in the different valleys. One of these leagues, formed in 1424, was called the *gray* league (Ger. *der graue bund;* in the native language, *lia Grischa*), from the gray homespun worn by the unionists, and hence the German and French names of the canton—Graubündten and Grisons. In 1472 these separate unions entered into a general federation, which then formed an alliance with the Swiss cantons. It was not till 1803 that Grisons was admitted into the Swiss confederation as the 15th canton. The constitution of Grisons is very complicated, and suffers from the want of centralization incident to its origin. Of the inhabitants, one-half speak German, and the others dialects derived from Latin. The dialects of the southern valleys are a kind of Italian; the Latin of the Engadine (q.v.) and the Romanese differ greatly from Italian, but are far from being Latin.

GRISSEH, or GRISSEE, a t. in Java on Madura strait, having a large population of natives and Chinese. It is one of the oldest towns in the island, and the place where Mohammedanism was first permanently established. There is a good anchorage, and considerable business in ship-building. Salt and saltpeter are found in the neighborhood.

GRISWOLD, ALEXANDER VIETS, D.D.; 1766–1843; b. Boston. In 1795 he was ordained, and began preaching in three different towns besides teaching school. In 1804 he went to Bristol, R. I. He was the first bishop of the Protestant Episcopal diocese comprising Vermont, New Hampshire, Massachusetts, and Rhode Island. His last public act was the consecration of his successor, Dr. Eastburn. He published a large num-

ber of his discourses, and a volume of *Sermons on the Most Important Doctrines and Duties of the Christian Religion.*

GRISWOLD, MATTHEW, LL.D., 1716–99; b. Conn.; governor of the state in 1784; afterwards judge of the supreme court. He presided over the convention that ratified the constitution of the union.

GRISWOLD, RUFUS WILMOT, D.D., 1815–57; b. Vt. In early life he was a roving printer. Studying divinity, he became a Baptist minister, but most of his work was in literature as associate editor of *The New Yorker*, the *Brother Jonathan*, and the *New World*. In 1842 he was editor of *Graham's Magazine*, and in 1850 he started in New York the *International Magazine*. He is best known by his *Poets and Poetry of America*, and *Prose Writers of America*. He also published *Curiosities of American Literature*, *Washington and his Generals*, *Napoleon and the Marshals of the Empire*, and *The Republican Court, or, American Society in the Days of Washington.*

GRIT is a coarse-grained sandstone, the particles of which are more or less angular, and compacted together by a hard siliceous cement. See MILLSTONE GRIT.

GRIVEGNÉE, a t. of Belgium, in the province of Liege, and about two m. s.e. from Liege, on the right bank of the Ourthe. Steam-engines and other machinery are extensively manufactured; also nails, copper wire, and strings for musical instruments. Grivegnée has brickworks, and worsted and fulling mills. There are coal-mines in the vicinity. Pop. 6,234.

GROAT (Dutch, *groot*, Ger. *groschen*, Fr. *gros*, Ital. *grosso*, Low Lat. *grossus*, from the same root as Eng. *great*, and meaning *thick*), a name given in the middle ages to all *thick* coins, as distinguished from the "bracteates" (Lat. *bractea*, a thin plate or leaf), or thin coins of silver or gold-leaf stamped so as to be hollow on one side and raised on the other. Groats differed greatly in value at different times and in different countries. The silver groat once current in England (introduced by Henry III.) was equal to four pence. The coin—though not the name—has been revived in the modern fourpenny-piece. Groschen were till lately current in the n. of Germany. The silver groschen, or neu groschen of Prussia and the Zollverein, was $\frac{1}{30}$th of a thaler, and worth $1\frac{1}{2}d.$; the guter groschen of Hanover $= \frac{1}{24}$th thaler $= 1\frac{1}{2}d.$

GROATS (also locally *grits*, from the same root as *to grate*, to rub to powder; allied to Eng. *scratch*, and Lat. *rado*, to scrape), the grain of oats deprived of the integuments. Groats are much used for preparing *gruel* for invalids, and were formerly also often used in broths and soups like pot-barley.—*Embden groats* are groats broken into small pieces by crushing.—Concerning the nutritive and other qualities of groats, see MEAL and OATS.

GRO'DEK, or GRUDEK, a t. of Austrian Galicia, 15 m. w.s.w. of Lemberg, with which it is connected by railway, is situated partly on a hill between two small lakes, and partly on three small islands. Pop. '69, 8,000, consisting chiefly of German colonists, but including also a number of Jews.

GROD'NO, a government of Russia, in the province of West Russia, and formerly a portion of Lithuania, is bounded on the n. by the government of Vilna, on the e. by that of Minsk, on the s. by Volhynia, and on the w. by Poland and the province of Bialystok. It has an area of 14,532 sq.m., and a pop. of '70, 1,008,521. The land is, in general, flat, and belongs in the s.w. to the basin of the Vistula, in the n. to that of the Nieman, and in the s.e. to that of the Dnieper. In the s. extensive morasses occur, although much marshy land has been already converted into pasture-ground by draining; and in the n. are extensive forests, chiefly of pine. The soil is light and sandy (except that of the river-valleys, which is clayey), and is in general fruitful. Rye is the principal agricultural product, the average annual yield being estimated at 2,346,000 English quarters. Barley, flax, hemp, hops, and timber are also extensively raised. The bear, the lynx, and the buffalo are found in the forests. Cattle, sheep, and bees are largely reared. The chief branches of industry are the manufactures of cloth, hats, paper, and leather, and the principal exports are corn, cattle, wool, leather, hops, honey, and wax.

GRODNO, a t. of Russia, capital of the government of the same name, is situated on an elevation on the right bank of the Nieman, 160 m. n.e. of Warsaw. It has fourteen churches and convents, several synagogues and castles, some ruinous palaces, belonging formerly to old Lithuanian families; a gymnasium; manufactures in cloth, silk, and weapons; and a flourishing trade, which is almost wholly in the hands of Jews, who form about three-fourths of the population. The modern palace, erected here by Augustus III., is an extensive and handsome edifice. The other principal buildings are the market-place, the equestrian seminary, the high school, the academy for medical science, connected with which are a library, collection in natural history, and a botanic garden. Here, in 1586, Stephen Bathori died in his own castle; and here, Nov. 25, 1725, Stanislas Augustus abdicated the Polish crown. Pop. '67, 24,789.

GROG, the name applied in the navy to the mixture of rum and water served out as a beverage to the men. Under recent regulations men who prefer abstaining from grog are allowed to receive money or tea in lieu thereof. Forced potations of *six-water grog*, consisting of one part rum to six parts of sea-water, are administered occasionally, by

way of punishment for dirtiness and some other offenses. The quaint name of *grog* is said to be derived from a nick-name of admiral Vernon, who introduced it into the service. In bad weather, he was in the habit of walking the deck in a rough *grogram* cloak; the sailors thence called him *Old Grog*, and then transferred the name to the drink.

GROINED VAULTING is that kind of vaulting in which the vault is not a plain barrel-vault from end to end, but where one vault cuts into another. The angle formed by the intersection is called the groin. In Roman architecture the groins were generally left as a plain sharp edge; in Gothic, they were usually protected and strengthened with *ribs*. See VAULT.

GROMWELL (*Lithospermum*), a genus of plants of the natural order *boraginæ*, having a funnel-shaped corolla, stamens shorter than the corolla, and *achenia* of stony hardness. Probably, on account of the last-mentioned character, extraordinary virtues were formerly ascribed to them, particularly to the COMMON GROMWELL, (*L. officinale*), in the cure of stone in the bladder, which, however, were wholly imaginary. The common gromwell is a native of dry gravelly places in Europe, Asia, and North America. It has an erect, much-branched stem, broadly lanceolate leaves, and small greenish-yellow flowers.—CORN GROMWELL, (*L. arvense*) with small white flowers, is more plentiful in Britain, and is of equally wide geographic distribution.—Two species, natives of the s. of Europe, *L. tinctorum* and *L. anchusoides*, yield a dye-stuff similar to alkanet, and which passes under that name.

GRO'NINGEN (anc. *Cruoninga*), the most north-eastern province of the Netherlands, is bounded on the n. by the North sea, on the e. by Hanover, on the s. by the province of Drenthe, and on the w. by that of Friesland. It has an area of 896 sq.m., and on Dec. 31, '73, its population amounted to 232,739. It is watered by the Hunse, which is navigable for large vessels from the town of Groningen to its mouth in the Lauwer sea, by other small streams, and by lakes and numerous canals. Its surface is flat, and is protected against the sea on the n. by dikes. The soil, which is principally alluvium, forms excellent arable land. The n. of the province contains the best soil, and is one of the most densely peopled districts of the kingdom. A considerable portion of the land (towards the s.e.) is marshy, and lies in pasturage, which supports a fine breed of cattle, and great numbers of highly valued horses and sheep. Farming and grazing are the chief pursuits of the people; fishing, commerce, and trade are also carried on, as well as manufactures to some extent. Ship-building is extensively followed, and much butter exported. The people are almost entirely of the Frisian race, and belong chiefly to the Reformed church.

GRONINGEN, an important fortified t. of the Netherlands, capital of the province of the same name, is situated on the Hunse, at the confluence of the Aa with that stream, 22 m. w. of Dollart bay. It is nearly circular in form, surrounded by walls and a fosse, and traversed by canals crossed by 18 bridges. The Hunse is here converted into a canal, and is navigable for large vessels, about 600 of which visit the town annually. The great market-place is 662 ft. long and 389 ft. broad, and contains the beautiful Gothic church of St. Martin's, with a noble tower 343 ft. high. The university, founded in 1614, possesses a library, a botanic garden, and a cabinet of natural history. Groningen has railway communication with Friesland, Germany, and southwards to all the Netherlands towns. The port of Groningen is good; it communicates by means of canals with Dollart bay on the e., with the Lauwer sea on the n.w., and with the entrance to the Zuider Zee at Harlingen on the west. There are ship-building yards and paper mills. Pop. Dec. 31, '76, 40,589.

GRONOVIUS, or GRONOV, JACOBUS, 1645—1716; son of Johann Freiderich, b. Holland. While young he became fully acquainted with classical authors, traveled in England, Spain, Tuscany, Italy, Venice, Germany, and other countries, to see for himself the treasures in their famous libraries, and finally settled as professor in the university of Leyden. He was a fierce and abusive controversialist, and had hot disputations with Fabretti, Vossius, Bentley, and others. He left 46 works, the most important of which is an ancient Greek thesaurus.

GRONOVIUS, or GRONOV, JOHANN FRIEDRICH, 1611—71; a Dutch scholar and critic, educated at Leipsic, and professor of *belles-lettres* in Leyden. He wrote a large number of critical works on Latin classics, poetry, etc.

GROOT, GERHARD, or GERARD the GREAT, 1340—84; b. Holland; educated in Paris, and a teacher of theology at Cologne. He was not in holy orders, but held a number of benefices, living luxuriantly until turned from his ways by a Carthusian monk. He then gave up his benefices, and, refusing any higher position than deacon, became a traveling and highly successful preacher. He opposed the scholastics, advocated the reading of the scriptures, and translated the Psalms into the common language. He gathered a company for the transcribing of books of the Bible, and enforced upon them the practice of community of goods. From this association arose the "Brethren and Clerks of the Common Life." The order grew rapidly, and in spite of the violent opposition of the monastic orders they were sanctioned by the pope in 1376.

GROO'TE EY'LANDT (English, *Great Island*) lies off the western coast of the Gulf of Carpentaria, in North Australia, and is the largest island in that vast inlet, in lat. 14° s. and long. 136° 40′ e. Its extreme length and breadth are about 40 m. each. The center is mountainous, and the shores are dry and barren.

GROS, ANTOINE JEAN, Baron, a French historical painter, was b. at Paris on Mar. 16, 1771, studied in the school of David, and first acquired celebrity by his picture of Bonaparte as the victor of Arcola. The latter was so much pleased with the work that he appointed Gros a member of the commission charged with collecting the objects of art which had been ceded to France by the treaty of Tolentino. His first great achievement, however, was the "Pestiférés de Jaffa" (The Plague-smitten at Jaffa), which was executed at Versailles in 1804. It excited prodigious enthusiasm, the author being carried in triumph to the saloon of the Louvre, where the picture was crowned in his presence. Other important works executed by Gros during the consulate and the Empire are: "Bonaparte aux Pyramides," "Le Combat d'Aboukir," "La Bataille de Wagram," "Charles-Quint reçu à Saint-Denis par François Ier." After the return of the Bourbons Gros painted, among other pictures, "Le Depart Nocturne de Louis XVIII. au 20 Mars 1815," "La Duchesse d'Angoulême s'embarquant à Pauillac," and "Charles X. au Camp de Reims." Besides these he finished, in 1824, an immense work for the cupola of the church of Saint-Geneviève in Paris, begun in 1811, to which, say his countrymen, "there is nothing comparable." It is not a fresco, but a painting executed in oil upon a peculiar kind of plaster, representing the four great dynasties of France doing homage to the tutelary genius of the nation. Charles X. was so charmed with the work, that he raised Gros to the dignity of a baron, and doubled the sum which the painter had originally stipulated for. The rise of the romantic school bore away from him the tide of popularity, and Gros felt the ebbing of his fame so acutely, that it is suspected he committed suicide in a fit of profound chagrin. At all events, his body was drawn out of the Seine near Meudon, June 26, 1835. Gros's paintings are all marked by strength of effect, and dramatic movement in the scene; they are, however, deficient in delicacy and sentiment, and exhibit a very ordinary power of imagination.

GROSE, FRANCIS, 1731—91; an English antiquary who traveled into many out of the way corners in search of objects of antiquity. He was jovial and somewhat dissipated in his youth, as Burns implies in his verses beginning "Ken ye aught of Captain Grose." Probably the best known of his works is the *Classical Dictionary of the Vulgar Tongue*, which has served as the foundation of many slang vocabularies in England and America. He wrote besides on English, Welsh, Irish, and Scotch antiquities, and on fortification, and was the author of a work entitled *A Guide to Health, Beauty, Riches and Honor.*

GROSS, SAMUEL D., LL.D., b. Penn. 1805. He graduated in medicine and began practice in Philadelphia, at the same time translating French and German medical works. In 1830 he published *Diseases of the Bones and Joints.* In 1833 he went to Cincinnati and was made demonstrator of anatomy in the college of Ohio, and soon afterwards professor of pathological anatomy, in Cincinnati college, where he delivered the first systematic course of lectures on morbid anatomy ever given in this country, which was published as a treatise under the title *Elements of Pathological Anatomy*, 2 vols. 8 vo. Boston, 1839. In 1840 he became professor of surgery in Louisville college, and in 1850 professor of surgery in the university of New York, but the next year returned to Louisville. In 1856 he was chosen professor of surgery in Jefferson medical college, and in 1867 was elected president of the American medical association. He is the author of several valuable works on medicine and surgery, but is best known as the author of one of the most comprehensive and valuable works on surgery, *System of Surgery*, 2 v. 8 vo.

GROSS'BEAK (*Coccothraustes*), a genus of birds of the family *fringillidæ*, distinguished chiefly by the great thickness of the bill, which has also a proportionate strength, and notwithstanding the small size of the birds, is used for breaking the stones of cherries, olives, etc. The hawfinch (q. v.) and greenfinch (q. v.) are the British species, nor are there any others in Europe; but some are found in other parts of the world, as the beautiful EVENING GROSSBEAK (*F. vespertina*) and the ROSE-BREASTED GROSSBEAK (*F. Ludoviciana*) in North America

GROS'SENHAIN, or HAIN, formerly also called Markgrafenhain, is a small manufacturing t. of Saxony, situated on the left bank of the Röder, 20 m. n.w. of Dresden. It is famous for its woolen and cotton manufactures. Pop. '75, 10,686.

GROSSETESTE, ROBERT, a celebrated English prelate of the middle ages, was b. at Stradbrook, in Suffolk, in the latter part of the 12th c. He studied at Oxford, and subsequently at Paris. On his return to England, he obtained a great reputation as a divine, and was the first lecturer in the Franciscan school at Oxford. In 1235 he was elected bishop of Lincoln, and at once commenced in the most vigorous fashion the reformation of abuses in his diocese. The most conspicuous and offensive ecclesiastical sin in Grosseteste's days was the conduct of the pope (Innocent IV.) in the matter of church appointments. It was common for his holiness to make grants of vacant benefices in England to Italians, and other foreigners, many of whom, it would appear,

never showed face in this country at all, but contented themselves with drawing the revenues of their office. This was intolerable to a man like Grosseteste, and he set himself strongly against it, incurring, by his boldness, a temporary suspension from the exercise of his episcopal functions, and a continual menace of excommunication. One of these transactions in the year 1253 has been the subject of much controversy. It is alleged by some writers that Innocent wrote to Grosseteste, ordering his nephew, an Italian youth, to be promoted to the first canonry that should be vacant in the cathedral of Lincoln, accompanying his injunctions with threats. The bishop was filled with indignation, and at once addressed a letter either to the pope or his agents, in which he declares, that "if an angel from heaven commanded him to obey a mandate so absurd and sinful, he would not do it," and compares the nepotism of the pope to the sin of Lucifer and anti-Christ. Innocent, according to these writers, was violently enraged at his opposition; he excommunicated Grosseteste, and even appointed a successor to the bishopric, but in this instance the thunder of the Vatican was harmless. Grosseteste quietly appealed to the tribunal of Christ, and troubling himself no more about the matter, continued to discharge his episcopal functions. The general feeling of the English nation sustained him; the clergy of his diocese went on obeying him as if nothing had happened; and at his death, Oct. 9, 1253, archbishop Boniface conducted the funeral services. But Dr. Lingard (ii. p. 502) has shown that the mandate came not from the pope, but from the nuncio; that Innocent, on receiving Grosseteste's reply, not only rescinded the order, but adopted measures for the reform of these abusive appointments; and that the story of his having died under a sentence of excommunication rests on very questionable authority. Grosseteste is commonly regarded as one of the "reformers before the reformation." It is assumed that because he quarreled with the head of the church on a matter of discipline, he must have been a "Protestant." But nothing could be further from the fact than such an assumption. He belonged to that class of minds who look at truth not from the side of *doctrine*, but of *practice*. He would have accepted, with acquiescence, any new doctrine from the Vatican, but a knavish trick was not to be endured, even at the hands of an angel from heaven! It is in the last degree futile, therefore, to claim him as a precursor of men like Luther, or Calvin, or Knox. In politics he was a constitutionalist, and a friend of Simon de Montfort, heartily interested in the preservation and extension of such liberty as England then enjoyed. His learning was prodigious, almost inspiring awe among his contemporaries. Latin, Greek, Hebrew, French, mathematics, medicine, and music were among his attainments. His knowledge of the Scriptures is also particularly lauded. Grosseteste was one of the most voluminous authors that England ever produced. The list of his works, as given by Dr. Pegge, of which only a few have been published, occupies 25 closely printed pages in quarto. For an intelligent estimate of his life and character, see Mr. Brewer's *Monumenta Franciscana*, and the collection of his letters edited by Mr. Luard, and published (1862) under the title, *Roberti Grosseteste Episcopi quondam Lincolniensis Epistolæ*.

GROSSETO, a province of Tuscany, Italy, on the Mediterranean, 1712 sq.m.; pop. '72, 107,457. It is mountainous, marshy, and to a large extent unfit for cultivation. Sugar, lumber, and coal are among the chief products. The principal town bears the same name.

GROSSE'TO, a t. of central Italy, capital of the Maremma (q.v.) on the Ombrone, about 10 m. from its mouth, and 70 m. s. of Florence. The town is very unhealthy, but it is well built, and is regularly fortified, the walls forming a pentagon with brick bastions and two gates. It is the seat of a bishop, has a fine cathedral, two convents, hospital, etc., and in the center of the square a colossal statue of Leopold II. There are manufactures of silk, and woolen goods, glass, etc. About 6 m. from Grosseto are the ruins of the very ancient Etruscan city of *Rusellæ*, the Cyclopean walls of which may still be traced. It was at one time so powerful as to be one of the twelve cities of the Etruscan league. Pop. 3,000.

GROSS-GLOGAU. See GLOGAU, *ante*.

GROSSULARIA'CEÆ, a natural order of exogenous plants, containing about 100 known species, all shrubs, natives of temperate climates, and chiefly of the northern hemisphere. They have alternate lobed leaves. The calyx is 4–5-cleft, the tube entirely or in part adherent to the ovary; the petals are very small, alternate with the segments of the calyx; the stamens are alternate with the petals, and inserted into the throat of the calyx; the ovary is one-celled, with two opposite parietal placentæ; the fruit is a berry crowned with the remains of the flower, having numerous seeds immersed in pulp, and suspended by long threads; the *testa* externally gelatinous, adhering firmly to the horny albumen. The most important species of the order are the gooseberry (q.v.) and currants (q.v.).

GROSSWA'RDEIN (Magyar, *Nagy-Varad*), a t. of Upper Hungary, in the co. of South Bihar, is situated in a beautiful plain on the Sabes Körös ("the rapid Körös"), 38 m. s.s.e. of Debreczin. It is the seat of a Roman Catholic, and of a non-united Greek bishop, and consists of the town of Grosswardien proper, and eight suburbs. The town is surrounded by a wall, and was formerly a fortress. The principal buildings are the

churches, of which there are 22, including the cathedral, a magnificent edifice. A great trade is carried on here, especially in pottery, in cattle-rearing, and in the cultivation of the vine. There are several distilleries. The town is connected by railway with Vienna. The entire population of this town in 1869 was 28,698. Grosswardein was taken and pillaged by the Turks in 1660, and by the Austrians in 1692.

GROS VENTRES, American Indians dwelling with the Arrapahoes on the upper streams of the Missouri river. Their greatest chief was Sitting Squaw, a friend of the whites. In 1870 they numbered about 1300. They have good lodges, on a reservation of 260 sq. miles.

GROTE, GEORGE, politician, historian, and philosopher, was b. 1794, at Clay Hill, Beckenham, Kent. His grandfather, Andrew Grote, a native of Bremen, settled in London in the beginning of the last c,, and in conjunction with Mr. G. Prescott, founded the London banking-house that still bears their joint names. His mother, Selina Mary Peckwell, was the daughter of the rev. Dr. Peckwell, chaplain to the countess of Huntingdon, who married an Irish lady, descended from an old French family in Touraine, one of whom, being a Protestant, settled in this country after the revocation of the edict of Nantes. Grote was educated at Charter house, and at 16 entered his father's banking-house, employing all his leisure hours in study. In 1823 he began to amass materials for a history of Greece. Previous to 1832 he wrote on parliamentary reform, and threw himself into the agitation for the reform bill. After the passing of the bill he was elected at the top of the poll, a representative of the city of London in parliament, and continued a member of the house of commons till 1841. His parliamentary career was chiefly distinguished by his annual motion for the ballot, but he spoke with great effect on many other questions. In 1843 he retired from the banking-house, and devoted himself exclusively to his history; the first two volumes appeared in 1846, and the last (twelve volumes in all) in 1856. He forthwith commenced the study of Greek philosopy, and in 1865 brought out his work on Plato. The remainder of his studious life was devoted to Aristotle, but he did not execute more than a part of what he intended. He died in 1871. After his death, appeared what he had composed on Aristotle; also a collection of essays, entitled *Minor Works*, and, in 1876, *Fragments on Ethical Subjects*. *The Personal Life of George Grote* was written by Mrs. Grote. He spent much of his time, in later years, in the management of the great unsectarian education institutions—University college, and the university of London—being, at the time of his death, president of the one, and vice-chancellor of the other. His whole career was marked by attachment to liberal opinions. He was not merely a man of erudite research; he devoted himself also to mental philosophy and logic, by which he became as much distinguished in his capacity of historian of philosophy as he was in political history.

GROTEFEND, GEORG FRIEDRICH, 1775–1853; b. Germany; educated at Gottingen, was rector in Frankfort, founded a society for the cultivation of the German language, and became director in the Hanover lyceum. He was the author of several works upon ancient and modern languages.

GROTESQUE', a style of classical ornament, so called in the 13th c., from its having been re-discovered in the excavations made in the baths of Titus and other ancient Roman buildings, the Italian word *grotto* applying to any subterranean chamber. This light, fantastic style was much in favor during the renaissance. It abounds in all kinds of transformations, from the animal to the vegetable, and mingles all the natural kingdoms in the most fanciful and picturesque confusion. The name *grotesque* thus came by degrees to mean a fanciful combination of natural ideas as applied to ornament. Thus, all the picturesque animal and vegetable *inventions* of the mediæval artists are grotesques. Some of these are very beautiful, and others very picturesque, and, generally, an idea of some value, such as boldness, fierceness, dignity, etc., is expressed. In this mode of application, the grotesque is a valuable quality in art; it is only when it becomes debased, as in the monstrosities of the renaissance, that its value is lost.

GRO'TIUS, HUGO, or DE GROOT, was b. at Delft, April 10, 1583. His father, Jan de Groot, was burgomaster of the town, and also curator of the university of Leyden. In his 11th year he entered the university of Leyden, where he enjoyed the advantage of studying under Joseph Scaliger. In his 15th year he took his degree. In the following year he accompanied Olden Barneveldt, the grand-pensionary, on his embassy to France, where, notwithstanding his extreme youth, his talents and conduct gained him the favor of Henry IV. On his return he began to practice as a lawyer; and in 1607 was appointed fiscal-general, and in 1613 council-pensionary at Rotterdam. But the disputes between the remonstrants and their opponents were now at their height in Holland; Olden Barneveldt had the misfortune to be the protector of the former, and Grotius also supported them by his writings and favor. These religious, or rather theological strifes had, however, a *political* significance also; and the consequence was, that both Olden Barneveldt and Grotius were arrested, tried, and condemned by the dominant party under prince Maurice (see BARNEVELDT). Olden Barneveldt was beheaded in 1619, and Grotius sentenced to imprisoment for life in the castle of Lovenstein. He

escaped, however, by the contrivance of his wife, who managed to have him carried out of the castle in a chest used for the conveyance of books and linen, while she remained in prison in his stead. Her devotion was applauded even by his stern masters, and she was set at liberty.

For some time Grotius wandered about in the Catholic portions of the Netherlands, and finally escaped to France, where Louis XIII. bestowed upon him a pension of 3,000 livres; but not paying sufficient court to Richelieu, he lost the king's favor, and in 1631 his pension was withdrawn. A friendly letter from prince Frederick of Orange induced him to return to his native country; but by the intrigues of his enemies, sentence of perpetual exile was soon passed upon him. He now removed to Hamburg, and, while there, he received invitations from the kings of Denmark, Poland, and Spain; but the protection promised him by the chancellor Oxenstiern, and queen Christina's taste for literature, induced him to enter the Swedish service in 1634. As ambassador at the French court (1635–1645), he gained universal respect. On his return to Sweden, he passed through his native country, and was received in Amsterdam with the most distinguished honor. Equally flattering was his reception by the Swedish queen; but the literary dilettantism of Christina's court did not suit so serious and solid a scholar, whose thoughts were always of the broadest and most forecasting nature. Besides, the climate of Sweden did not agree with him, and he was probably anxious to spend the evening of his life in his native land. In consequence, he sent in his resignation of office to the queen, who, when she found that nothing could induce him to stay, presented him with a sum of 10,000 crowns and some costly plate, besides placing at his disposal a vessel to conduct him down the Baltic to Lübeck. A storm compelled him to land on the coast of Pomerania. While proceeding towards Lübeck, he was seized with a fatal illness, and died at Rostock, Aug. 28, 1645. To the talents of a most able statesman Grotius united deep and extensive learning. He was a profound and enlightened theologian—perhaps the best exegete of his day, a distinguished scholar, an acute philosopher, a judicious historian, and a splendid jurist. Altogether, he was what Ménage called him, "a monster of erudition." His metrical translations from the Greek authors also display superior poetical powers, he was one of the best modern writers of Latin verse, and likewise composed poems in the Dutch language. In spite of his broken, wandering and checkered career, Grotius found time to write a great variety of works. The first was the *Mare Liberum*, in which he defended the freedom of the Dutch East India trade. His chief work, however, is that entitled *De Jure Belli et Pacis*, which has been translated into all the languages of Europe. It may be considered as the basis of international law, and has long been used as a text-book on the subject in many universities. Among his other works we may mention *Annales et Historiæ de Rebus Belgicis* (Amsterdam, 1657), written in a style that equals Tacitus for concise and pointed power; *Annotationes in Vetus Testamentum* (Paris, 1644); *Annotationes in Novum Testamentum* (Paris, 1644); *De Satisfactione Christi*; and *De Veritate Religionis Christianæ* (Leyden, 1627), translated even into several oriental languages, and remarkable for its clear arrangement, vigorous logic, and eloquent style. It is reckoned the best "apology" for Christianity in modern times.—Compare Butler, *Life of Grotius* (London, 1826); De Vries, *Huig de Groot en Maria van Reigersbergen* (Amsterdam, 1827); Creuzer, *Luther und Hugo Grotius* (Heidelberg, 1846).

GROTON, a t. in New London co., Conn., on Long Island sound, intersected by the Stonington and Providence railroad; pop. 5,124. The township contains several thriving villages. One of the historical points is fort Griswold, where a white garrison was massacred early in the revolution by tories.

GROTON, a village in Middlesex co., Mass., on the Nashua and Worcester railroad, 31 m. n.e. of the latter city; pop. 1908. The Lawrence academy is an institution of importance, and there are other good schools.

GROT'TA DEL CANE, or GROTTO OF THE DOG, is a noted cave near Naples, in the vicinity of lake Agnano and of Puzzuoli. It is about 10 ft. deep, 4 ft. wide, and 9 high, and is so full of carbonic acid gas, especially near the floor, that little animals introduced into it soon die, and tapers placed near the ground are extinguished. This cave was known to the ancients, and is described by Pliny. It derives its name from the practice of introducing small dogs, which are soon almost deprived of life by the gas, but recover upon being restored to the open air.

GROTTA'GLIE, a t. in the s. of Italy, in the province of Lecce, 12 m. n.e. of Taranto. Pop. '72, 8,747. It dates from the 10th c., when the inhabitants of several surrounding villages, that had been laid in ruins by the Longobards and Saracens, sought refuge here, and gave the name of Grottaglie to their new dwellings, from the *grotte* or caves which intersect the hill at at the foot of which the town stands.

GROT'TE', a t. of Sicily, in the province, and 13 m. n.n.e. of Girgenti. It derives its name from the number of caves in the rocks around it, which prove it to have been an ancient site. It is supposed by some to be that of *Erbessus*, a town where the Romans deposited their military stores during their siege of Agrigentum, in 262 B.C., but which was seized by Hanno, the Carthaginian gen. Sulphur is found largely in the neighborhood. Pop. 7,300.

GROUCHY, EMMANUEL, Marquis de, 1766–1847; entered the French republican army in 1790, and two years later was maj.gen. of cavalry in the campaign against Savoy. Subsequently he defeated the Vendeans, served under Morreau in Piedmont, and was taken prisoner by the Austrians, kept a year, then joined Morreau and fought at Hohenlinden, at Jena, Eylau, and Friedland, with conspicuous gallantry. He won further distinction at Wagram and Boridino. He commanded the emperor's guard on the retreat from Moscow. On the return of Napoleon from Elba he was made a marshal, and in the close of the emperor's career, played a leading part, but by too literally obeying orders at the battle of Waterloo, he was the indirect cause of Napoleon's overthrow. Grouchy had been ordered to prevent the Prussians under Blucher from joining the English, and he obeyed to the letter. But had he taken the advice of his generals, and marched to Napoleon's aid at a time when the fight was so hot that Wellington cried "O for Blucher or night," he might have effected the entire defeat of the allies. He adhered to his orders, however, and Napoleon was lost. Under the second restoration he was proscribed, and for some years lived in Philadelphia, Penn. He returned to his native country in 1821, and after 1830 was restored to his rank of marshal.

GROUND, in painting, the coating or preparation put on the surface of the panel, board, or canvas on which a picture is to be painted. Artists attach great importance to the color and texture of the ground, as tending in no small degree to affect the technical quality of the work. In forming an opinion on paintings by old masters, the kind of ground used is always taken into consideration, for in different epochs and schools, particular grounds were used. The works of the Italian school preceding and during the time of Raphael were all painted on white grounds, and almost always on panels, even when the works were large, and many pieces had to be joined. The preparation was composed of *gesso*, plaster of Paris, or chalk mixed with size, and the ground was of course absorbent. Afterwards, when canvas came to be generally used, the works of the Italian and Spanish schools were generally painted on an oil ground of a dull red color; and when this was not covered by the artist with a thick *impasto* or body of paint, the picture was apt to become black and heavy, a fault very marked in the works of the school of the Carracci and the Neapolitan and later Roman schools. The works of the Dutch and Flemish masters, which are distinguished for brilliancy and transparency, were painted on light grounds, varying from white to gray, and their practice is generally followed in this country and in the modern schools abroad. The term *ground* is also applied to different parts of a picture, as the *foreground*, or portion of the picture on which are placed the figures or objects represented as nearest the spectator; *background*, the part, particularly in portraits, behind or on which it is intended to set off or relieve the head, figure, or group depicted. The portion of a model or carving from which the figures are projected, is styled the ground.

GROUND-ANNUAL, in the law of Scotland, is an annual rent or annuity paid by the owner of land to a creditor or to the vendor of the land, and in most respects corresponds to ground-rent (q.v.) in England, though the parties stand in a converse relation. It also resembles a rent-charge (see RENT) in England, with a like distinction. Thus, when a vendor sells his land, and instead of taking a lump sum for the price, prefers a sum by way of a perpetual annuity or rent, he conveys the land in fee to the disponee or purchaser, subject to this ground-annual, which is a burden on the lands forever after. The vendor or creditor is then called the ground-annualer, and if the ground-annual is not paid, he is entitled as a remedy to poind the ground, i.e., seize all the goods, whether of the owner or his tenants, which are found on the lands, and pay himself, or he may sue the debtor. But he cannot, as a ground-landlord can do in England, poind the goods of the debtor's tenants to a greater extent than the current term's rent or arrears due by them.

GROUND DOVE AND **GROUND PIGEON** are names given to those birds of the family *Columbidæ* which in characters and habits approach most to the ordinary gallinaceous type. They have short and rounded wings, with much inferior power of flight to pigeons in general; their legs are longer, and their feet rather adapted for walking than for grasping. They are little arboreal in their habits, but live mostly on the ground. Many of them run very quickly. They have not in general much brilliancy of plumage, but among them are the beautiful bronze-wings (q.v.) of Australia.

GROUND HOG. See WOOD-CHUCK, *ante*.

GROUND ICE, or ANCHOR ICE, a kind of ice of rare occurrence formed at the bottom of shallow streams.

GROUND-IVY, *Glechóma hederacea*, united with the genus *népeta* by some botanists as *N. glechoma*, a plant of the natural order *labiatæ*, a common native of Britain and other parts of Europe, growing in waste places, plantations, hedges, etc., in a dry soil. It has a creeping stem, kidney-shaped crenate leaves, and axillary blue flowers growing in threes. The flowers have four ascending stamens, two long and two short, a 15-nerved 5-toothed and equal calyx, the anthers before bursting approaching in pairs and forming a cross. A tea prepared from the leaves is in great repute among the poor in many places, and the plant is stimulant, aromatic, and of use in pectoral complaints. The leaves were formerly used in England for clarifying and flavoring ale, which was then

called gill-ale or gell-ale, from gill or gell, an old name of this plant; but this use has been discontinued since the introduction of hops.

GROUNDLING, *botia tænia*, a small fish of the family *cyprinidæ*, found in some of the rivers of England. It is never more than 3 or 4 in. long. It receives its name from habitually keeping close to the bottom. It is probably often mistaken for the loach (q.v.), which it much resembles; but, besides its smaller size, it is of a much more compressed form, and is particularly distinguished by a forked spine beneath each eye. These have been made generic distinctions. Several species having these characters are found in the Ganges.

GROUND-NUT, a term variously employed, to denote the seed of the *arachis hypogæa*, (see ARACHIS), and the tubers of certain umbelliferous plants, also called EARTH-NUTS (q.v.).

GROUND-PINE, the popular name of the *lycopodium clavatum*, an evergreen vine sometimes three yards long. It is of the genus *ajuga*. Another species is the club-moss, a handsome little plant of tree-like form about 8 in. high.

GROUND-RENT, in the law of England, is the rent which a person, who intends to build upon a piece of ground, pays to the landlord for the use of the ground for a certain specified term, usually 99 years. The usual arrangement between the owner of the freehold of land and a speculating builder, is of this kind. The builder pays a certain annual sum by way of rent to the owner, who is thereafter called the ground-landlord, and then commences to build upon the land. The builder then lets the houses, and in doing so he of course includes in the rent which he puts upon each house a proportionate part of this ground-rent, which he himself is bound to pay to the ground-landlord, so that practically the tenant pays both the rent and the ground-rent, the latter being so called because it issues out of the ground, independently of what is built upon it. Ground-rents often form a safe investment for capital, because the security is good. This security consists in the ground-landlord being able, whenever his ground-rent is in arrear, to distrain all the goods and chattels he finds on the premises, to whomsoever they may belong; and as the ground-rent is generally a small sum, compared with the furniture of the tenant, he is always sure to recover its full amount. This power of distress exists whether the tenant has paid his rent to his own landlord or not; but if at any time the tenant has been obliged to pay the ground-landlord the ground-rent, which it is the duty of his own landlord in general to pay, he may deduct such sum from the next rent he pays, or, as it is called, may set off the one against the other so far as it will go. Strictly speaking, there are thus two landlords. The ground-landlord is the over-landlord, and has the paramount security; the other landlord is landlord to the tenant who actually occupies, but is himself tenant to the ground-landlord, for he merely holds a lease. He is what is called a mesne landlord. At the end of the 99 years, or whatever other term is fixed upon, the whole of the building becomes the property of the ground-landlord, for the interest of the builder or his assignees then expires by effluxion of time; and as the building is a fixture, and cannot be carried away, it thus falls in to the landlord, and often thereby creates a great accession of wealth.

Ground-rent corresponds to *feu* in Scotland, with this difference, that the feu-rent in the latter case lasts forever, there being no definite term fixed for its ceasing.

GROUNDSEL, the common name of those species of *senecio* (q.v.) which have small heads of flowers either destitute of ray or with the ray rolled back. The COMMON GROUNDSEL (*S. vulgaris*), one of the most plentiful of weeds in waste and cultivated grounds in Britain and most parts of Europe, is usually destitute of ray. It is a coarse-looking annual, of rapid growth, about a foot high, branched, with pinnatifid leaves, and small yellow heads of flowers; flowering at all seasons, even in winter, when the weather is mild; and its seeds, like those of other *compositæ*, are widely diffused by means of their hairy pappus, being wafted about by the wind. It has a rather disagreeable smell; but birds are very fond of the young buds and leaves, and cage-birds are fed on them. It has a saltish taste, whence its name. Its leaves, beaten into a coarse pulp, and externally applied to the stomach, cause vomiting some hours after their application; it also makes a good poultice for boils and sprains.—The other British species are weeds of very similar appearance, but are stronger, have a more disagreeable odor, and are viscid to the touch.—Like other annual weeds, the groundsels are to be hoed down or pulled as they appear, when the ground is in crop.

GROUND SQUIRREL, *tamias*, a genus of rodent quadrupeds of the squirrel family, differing from the true squirrels in the possession of cheek-pouches, in having a more slender body and shorter legs, and in other less important particulars; but most of all in their habits, residing chiefly on the ground, and seldom ascending trees to any considerable height. They are of small size, are all longitudinally striped on the back and sides, are extremely active and restless, and emit a peculiar "chipping, clucking sound, very widely differing from the quacking, chattering cry of the squirrels." A well-known species is the HACKEE or CHIPPING SQUIRREL (*T. lysteri*) of North America, of a brownish-gray color, striped with black and yellowish white, the belly white. It is much persecuted by boys, with whom the hunting of it is a favorite sport. The fur is

used for muffs, tippets, etc. Other species of ground squirrel are found in America, Asia, and Africa.

GROUP, the combining of several bodies so as to form an agreeable whole. In drawing, one or more groups compose the picture. A bunch of grapes, a cone, or a pyramid have been taken by different artists as the model form of a group.

GROUSE, *tetrao*, a genus of gallinaceous birds, which, as defined by Linnæus, included partridges, quails, and all the birds now forming the family *tetraonidæ*, and divided into many genera. The *tetraonidæ* have a very short bill, rather thick, sharp, and a little curved, and very generally a naked red patch over or behind the eye. They have three toes before, and generally one hind toe, placed high on the tarsus, but the hind toe is often very short, and sometimes wanting. Those to which the name Grouse is popularly given have the legs feathered to the feet, but in the genus *tetrao*, as now restricted by ornithologists, the toes are not feathered; in moorfowl and ptarmigan, they are completely so, and these have therefore been separated into a distinct genus, *lagopus*. Partridges, quails, etc., which have not the tarsi feathered, are regarded as connecting the families *tetraonidæ* and *phasianidæ*, and are sometimes referred to the latter, although their intimate connection with the former is generally recognized. Some of the *tetraonidæ* are polygamous, and this is the case with all, or almost all, the species of the genus *tetrao*, whilst those of *lagopus*, so nearly allied to them, pair.—The genus *tetrao* contains the largest birds of the family, exceeded in this respect by almost no other gallinaceous birds. They have a full figure, with much muscular power, the tail is longer than in most of the family, is composed of broad feathers, and generally rounded. The females differ very considerably in plumage from the males, which are often resplendent in black, brown, green, and blue. The species are natives of the northern and temperate parts of Europe, Asia, and America, the regions in which the *tetraonidæ* in general are most abundant, although some of the family are found in warmer and more southern countries.—The largest species of *tetrao* is the capercailzie (q.v.), Wood grouse, or cock of the woods (*T. urogallus*); and next to it, among European species, ranks the blackcock (q.v.), (*T. tetrix*), the only other European species indeed, if the somewhat rare *T. hybridus* of continental Europe, the *racklehahn* of the Swedes (see Blackcock), be regarded as the result of a mere accidental intermixture of these two. —The Pinnated Grouse, or Prairie Hen (*T. cupido*) of North America, is rather smaller than the blackcock; the general color of the plumage is yellowish-red, with bars and crossings of black; the tail is very short and much rounded. The male has neck-tufts of narrow feathers, the largest of which are five inches long, and is still more remarkably adorned with two loose pendulous wrinkled skins, extending along the sides of the neck for two-thirds of its length, capable of inflation with air, and when inflated, resembling in bulk, color, and surface, middle-sized oranges. This species of grouse chiefly inhabits dry open districts, studded with trees or patches of brushwood. It was at one time common in New Jersey and Pennsylvania, as well as in the western prairies, but has always become rare as a district has become cultivated and populous, notwithstanding laws in some cases enacted for its preservation. It has almost disappeared from the state of Kentucky, where it was at one time so extremely abundant, that children were constantly employed to prevent its depredations in the cultivated fields, and multitudes were shot and trapped merely to be thrown away. In the north-eastern parts of the United States it exists, but is not abundant. It congregates in flocks in winter, which break up into smaller parties in spring. The males have many combats at the approach of the breeding season. Their voice is described as a low *tooting* or *booming*. They strut, after the manner of turkey-cocks, with wings let down to the ground, and neck-feathers erected. Certain spots, known in the western parts of America as their *scratching-places*, seem to be specially appropriated for their displays and combats, and there considerable numbers often meet about daybreak, dispersing again after the sun is up. Many are shot on such occasions. The food of the pinnated grouse consists of seeds, berries, the buds of trees and bushes, insects, etc. It is highly prized for the table in those parts of America where it is rare. The flesh resembles that of the blackcock.—The Spotted Grouse, or Canadian Grouse (*T. Canadensis*), is smaller than the pinnated grouse, about equal to the Scottish moorfowl. It inhabits the northern parts of America, and is plentiful near Hudson's bay. It is chiefly found in forests of pine or fir, feeding much in winter on the leaves and branchlets of these trees, as well as on their seeds, whence it is often called the spruce partridge. From this food the flesh acquires a strong and peculiar flavor in winter. The plumage of the upper parts is mostly brownish-black, transversely barred with brownish-gray; in some parts varying to a rusty orange. The tail is rounded.—The Dusky Grouse (*T. obscurus*) is a species almost as large as the capercailzie, a native of the shady forests of the Rocky mountains and the banks of the Columbia. The general color is blackish-brown, the wings lighter. The tail is large and rounded.—The Moorfowl (q.v.), or Red Grouse of Britain, is allied to the ptarmigans rather than to these species, and is called red ptarmigan by some systematic writers, although it is the species to which, in popular language, the name grouse is almost exclusively appropriated in Britain. Other species, often popularly called grouse, are noticed in the articles Bonasia, Cock of the Plains, Ganga, Syrrhaptes, etc.

GROUSSET, PASCHAL, b. Corsica 1845; became a journalist in Paris and wrote with Rochefort for the *Marseillaise*. He was always an extremely violent radical as was shown in his furious journal *La Bouche de Fer*. Under the insurrection in 1871 he was foreign minister of the central committee and held the same position in the commune. In June he was arrested in the disguise of a female. He was exiled to New Caledonia in 1872, and escaped two years afterwards.

GROVE, Sir WILLIAM ROBERT, b. England 1811; educated at Oxford. He began the practice of law, but left it for the study of electricity with which his name is associated in the powerful Grove battery. He was professor of experimental philosophy in the London institution, and a member of the council of the royal society. Returning to the law he became prominent in the South Wales and Chester circuits. He was knighted in 1872 when he was a justice of the common pleas. Afterwards he became judge of the high court of justice. He has published several works on subjects connected with electricity and electrical experiments, and an essay on *The Correlation of Physical Forces*, which has been translated into various European languages.

GROVER, CUVIER, b. Me., 1829; a graduate of the military academy. He served with credit on the union side in the war of the rebellion, attaining the rank of maj.gen. of volunteers. In the regular army he is a col. of cavalry.

GROVES have, among almost all nations, been associated with religious rites, being chosen as suitable places for them, or even planted in order to this use. The pleasantness of groves may have had something to do with this, but probably far less than the sentiments of awe and solemnity naturally excited by the gloom of deep forests. Groves became so intimately associated with the idea of sacrifice and other religious rites, that the planting of a grove became itself an act of religion, like the erection of an altar or the building of a temple. Thus, "Abraham planted a grove in Beersheba, and called there on the name of the Lord, the everlasting God" (Gen. xxi. 33). Afterwards, however, the Jews were forbidden to plant groves near the altar of the Lord (Deut. xvi. 21, 22), because of their association with idolatry, and with the cruel and abominable rites of the nations of Canaan, and of the neighbors of the Jews.

GROVETON. See BULL RUN, SECOND BATTLE OF.

GROW, GALUSHA A.; b. Conn. 1823; graduated at Amherst college 1844, and entered upon the study of the law. He injured his health by over-study, and on being admitted to the bar in 1847, settled in the elevated regions of central Pennsylvania, where he became in 1850 state surveyor of wild lands. He was elected from Pennsylvania to each alternate congress from 1851 to 1863, and was speaker of the house of representatives 1861–63. He was a delegate to the Baltimore republican convention of 1864, which nominated Lincoln and Johnson. In 1875 he was out of politics, being president of a railway company, and residing in Houston, Tex. In 1878 he declined the nomination for congress, and the same year was a candidate for the nomination for governor of Pennsylvania, making a sharp contest, but being defeated by H. M. Hoyt. He continued prominent in politics in 1879–80, and at the present time (Dec., 1880) is prominent among the candidates for U. S. senator from Pennsylvania.

GROWING CORN on a farm, or on land let to a tenant, may be distrained in England by the landlord for rent which is already due and in arrear; that is, the landlord may seize and sell the corn to pay his rent. In Scotland, growing corn may also be sequestrated by the landlord (which means the same thing); but this can be done only for the rent which is current, and which will become due for the same year to which the crop belongs. In England, the landlord can distrain for several years' rent at one time.

GROWLER, *Grystes salmoides*, a fish of the perch family, abundant in many of the rivers of North America, as in the neighborhood of New York. It attains a length of two feet. It is of an olive color, dark on the upper parts, and becoming grayish-white beneath. The growler is much esteemed for the table. It affords good sport to anglers. It receives its name from a sound which it emits. The genus grystes has small scales and only fine cardlike teeth. Another species is found in the Macquarie river, in New Holland.

GRUB, the name commonly given to the larvæ of coleopterous insects. See COLEOPTERA. Some grubs are too well known to farmers and gardeners for the injury they do to the roots of plants, and thus we hear of crops suffering from *the grub*, but different species are destructive to different kinds of plants. The most important are noticed under their proper names, and reference is made from the more important cultivated plants to those grubs most hurtful to them.

GRUBBER, an agricultural implement which has recently come into very general use, and of which there are many forms or varieties, all, however, essentially the same in their principle as well as in their uses. Some of the forms are called by their inventors *cultivators* and *scarifiers*. The grubber consists of a framework of cast or wrought iron, in which are fixed *tines* or teeth, somewhat like those of a harrow, but curved, and so placed as to enter the ground somewhat obliquely when the implement moves forward; the whole moving on wheels, by which the depth to which the teeth may penetrate is regulated; it is provided with various mechanical adaptations, enabling the workman

somewhat to vary the depth, or to lift the teeth out of the ground partially or altogether, when it may be necessary to clear them of obstructive clods or accumulations of weeds, to turn at the head of a ridge, or to travel to or from the field. The grubber is sometimes used for tearing up clover-fields and stubbles before the plough is used, but more generally in land already ploughed, to stir it afresh, to clear it of weeds, to bring clods to the surface, that they may be broken, etc. A grubber with five teeth gives work for two strong horses.

GRUBER, JOHANN GOTTFRIED, 1774–1851 ; b. Prussia ; the author of a large number of works on imaginative, historical, and critical subjects, and with Ersch edited the *Allgemeine Encyklopädie der Wissenschaften und Künste*, made the most voluminous encyclopædia in any European language.

GRU'GRU, the grub or larva of *Calandra palmarum* (also called *Rhyncophorus palmarum*, and *cordylia palmarum*), an insect of the weevil family (*Rhyncophoræ*), inhabiting Guiana and other tropical parts of America. The perfect insect is an inch and a half long. The grub is an ugly inactive creature of a whitish cream color, as long and as thick as a man's thumb, and lives in the soft and spongy central part of the cabbage palm (*euterpe oleracea*), on which it feeds. It is extremely fat and oily, and is esteemed a great delicacy, not only by the Indians, but by many of the European colonists and their descendants, particularly the Dutch. It is cooked by roasting, and eaten with bread and butter, after being sprinkled with cayenne pepper, The fragrance of roasted grugru is said to be most tempting to epicures. A cabbage palm which has been cut down often becomes in a short time almost filled with grugrus; but they are usually obtained from the upper part of the stem of growing palms near the crown. A negro is often sent up with a cutlass, to cut them out of the wood.

GRÜN, ANASTASIUS. See AUERSPERG, A. A.

GRÜN'BERG, a t. of Prussia, in the province of Silesia, is prettily situated near the northern boundary of the province, on the Golden Lunse, 59 m. n.n.w. of the town of Liegnitz. It consists of the town proper, surrounded by a wall, pierced by three gates, and of four important suburbs, and is seated amid vine-clad mountains. Grünberg is chiefly known for the fine sparkling wine which is extensively produced in the vicinity. The 700th year of its trade in this excellent commodity was celebrated here in Oct., 1850. Grünberg has also an active trade in the manufacture of woolen cloths and tobacco, and in the growing of fruit. Pop. '75, 12,248.

GRUNDTVIG, NICOLAI FREDRIK SEVERIN, 1783–1872 ; b. Denmark ; educated at Copenhagen. He became a leader of the Danish party in the diet, favored a union of the Scandinavian kingdoms, and vigorously opposed German influence. He is best known by his books on *Northern Mythology*, a translation of *Saxo Grammaticus*, and some volumes of poetry.

GRUNDY, a co. in n.e. Illinois, on the Illinois river, and the Chicago and Alton, and Chicago, Rock Island and Pacific railroads ; 432 sq.m. ; pop. '80, 16,738. It has a level surface and fertile soil ; chief productions: corn, oats, hay, and cattle. Co. seat, Morris.

GRUNDY, a co. in n.e. Iowa on the affluents of Red Cedar river ; 500 sq.m. : pop. '80, 12,639. It has an undulating surface and a fertile soil, producing corn, wheat. oats, hay, etc ; Co. seat, Grundy Center.

GRUNDY, a co. in n. Missouri on Weldon river, crossed by the Chicago, Rock Island and Pacific railroad ; 462 sq.m.; pop. '70, 10,567—115 colored. It has a prairie surface, and the soil is fertile ; chief productions: wheat, corn, oats, butter, and wool. Co. seat, Trenton.

GRUNDY, a co. in middle Tennessee on the Rock and Elk rivers ; 340 sq.m.; pop. '70, 3,250—137 colored. The surface is rough and mountainous, but the soil is fertile, producing wheat, corn, and cotton. Co. seat, Tracy City.

GRUNDY, FELIX, 1777—1840 ; b. Va. ; educated for a physician but went into law practice. He was member of the state constitutional convention, of the legislature, and judge of the court of errors and appeals. About 1807 he was made chief-justice of Kentucky, but he almost immediately resigned and settled in Nashville. He was twice chosen a member of congress, and in 1829 became a senator and an active supporter of president Jackson. In 1838 he was appointed attorney-general of the United States.

GRUNER, WILHELM HEINRICH LUDWIG, b. Germany, 1801; studied in various countries, and became noted as an engraver. At the king's desire he produced for the Berlin museum a number of Raphael's cartoons from the originals at Hampton court. He had a share in the decoration of the London crystal palace, and in the decorations of Osborn castle and Buckingham palace. Among his works are "Fresco Decorations and Stuccos," Layard's "Nineveh," Raphael's "Caryatides from the Vatican," and "Bas Reliefs on the Façade of the Cathedral at Orvieto."

GRUS AND GRUIDÆ. See CRANE.

GRUTLI, or RUTLI, a small tract of meadow in Uri canton, Switzerland, about 5 m. s.w. of Schwytz, believed to be the place where in Nov., 1307, Arnold of Melchthal,

Fürst, and Stauffacher planned the revolt against Austria which resulted in the independence of Switzerland. The tract was purchased in 1858 by the Swiss republic. Tell chapel is 3 m. distant from Grutli.

GRUYÈRES, a small decayed t. of Switzerland, in the canton of Freiburg, and 16 m. s.s.w. of the town of that name, is situated in about a mile from the left bank of the Saane or Sarine. The town is known chiefly from its giving name to the famous Gruyères cheese, which is made in great quantities in surrounding district. Pop. '70, 1097.

GRYLLUS, a Linnæan genus of insects of the order *orthoptera,* answering to the section *saltatoria* (Lat. leapers) of later entomologists, and containing crickets, grasshoppers, locusts, etc. The genus has been subdivided into many genera, which have been grouped into families; but great confusion exists in the nomenclature, the crickets and their allies being the genus *gryllus,* and family *gryllidæ* of some authors, *acheta* and *achetidæ* of others; grasshoppers being *gryllus* and *gryllidæ* of some, *locusta* and *locustidæ* of others; and locusts in like manner being *locusta* and *locustidæ,* or *acrydium* and *acrydidæ.* See CRICKET, GRASSHOPPER, and LOCUST. The three groups are very closely allied. They are all characterized by the large thighs of the last pair of legs, and great power of leaping. The stridulous sounds which they emit are produced in some—crickets and grasshoppers—by rubbing together the bases of the elytræ; in others—locusts—by rubbing the thighs against the elytræ. The females generally lay their eggs in the ground.

GRYS-BOC (*Antilope melanotis* or *Calotragus melanotis*), an animal of the antelope family, a native of s. Africa, and common in most parts of Cape Colony. It is about three feet in length, and about a foot and a half in height at the shoulder. The Grys-boc lives in pairs on the plains. It is not very swift, is easily captured, and its flesh is much esteemed.

GUACA, or HUACA, a Peruvian word which the Spanish writer Herrera affirms means temple. Another writer takes it to be a name for the evil spirit. At the present time it is the name for the grave of an Indian. A little more than 20 years ago there was much excitement in Central America in consequence of the finding in these old tombs of small images of gold representing indigenous animals. The presence of the figures has been explained by the assumption that they were the handiwork of artificers who belonged to a race which inhabited the Pacific shores of America, at a period long anterior to that of the ancient Peruvians.

GUACHA'RO, *Steatornis Caripensis,* a remarkable South American bird, of the order *insessores,* and tribe *fissirostres,* generally referred to the family *caprimulgidæ,* but widely differing from the goatsuckers and most of that family, and indeed from the *insessores* generally, in having a strong bill, and being frugivorous. The food of the guacharo consists of hard and dry fruits. It is about the size of a common fowl; the plumage brownish gray, with small black streaks and dots. The guacharo is a nocturnal bird, a circumstance very singular among frugivorous birds. It spends the day in deep and dark caverns, where great numbers congregate and make their nests. Humboldt gives a most interesting account, in his *Personal Narrative,* of a visit to the great guacharo cavern in the valley of Caripe, near Cumana. This cavern is visited once a year for the sake of the fat of the young birds, which are slaughtered in great numbers, and their fat melted and stored for use as butter or oil. The clarified fat is half liquid, transparent, inodorous, and will keep for a year without becoming rancid.

GUACHINAN'GO, a small t. of Mexico, in the n. of the state of Puebla, and 103 m. n.e. of the city of Mexico, has a population of 6,000, and is noted for the great quantity of excellent vanilla raised in the vicinity.

GUA'CHOS, the name given to the country-people who inhabit the pampas in the states of La Plata, and are engaged in rearing cattle. Although they pride themselves on being whites, they belong chiefly to the Mestizo class, and by their intercourse with Indian women, contribute to approximate the population of the inland provinces to the type of the aboriginal inhabitants, whom they likewise greatly resemble both in their manners and turn of mind.

GUADALAJARA, a province of Spain, the most north-eastern of the five modern provinces into which New Castile has been divided. Pop. '70, 208,638. See CASTILE.

GUADALAJARA (anc. *Arriaca*), a decayed town of Spain, capital of the province of the same name. is situated on the left bank of the Henares, 35 m. n.e. of Madrid. It is a large but ill-built town, and contains many buildings of interest, which, however, are for the most part falling to ruin from neglect. The chief of these are the palace of the Mendozas, the feudal lords of Guadalajara, the *Panteon,* in which they are buried, and the churches of San Francesco and San Esteban. Guadalajara is the chief town of the fine pastoral and wheat district of the Alcarria. Pop. 7,650.

GUADALAJARA, or GUADALAXARA, one of the handsomest towns in Mexico, is the capital of the state of Xalisco, in the Mexican confederation. It stands on the Rio Grande de Santiago, which, after passing through Lake Chapala, enters the Pacific at San Blas. The population has been estimated at 90,000. As the houses are generally but two stories high, the place covers a wide extent of surface. It contains the build-

ings for the government, a cathedral, a mint, an episcopal palace, an opera, large barracks, a college, and many inferior seminaries. It has well-supplied markets, and extensive manufactures of cotton and earthenware.

GUADALAVIA'R, or TURIA, a river of Spain, has its source near that of the Tagus, in the s.w. of Aragon, and after a course of 130 m. in a generally s.s.e. direction falls into the Mediterranean, at Grao, a mile and a half e. of Valencia. The Guadalaviar, in passing through the beautiful gardens of Valencia, is divided, for the purpose of irrigation, into eight canals. Its mouth is much silted up.

GUADALQUIVIR (Arab. *Wad-al-Kebir*, the great river; anc. *Baetis*), the most important river of Spain, for the mass of waters which it conveys to the ocean, and for the extent of its natural navigation; has its origin in the Sierra de Cazorla, near the eastern border of the province of Jean; flows in a general s.w. direction through the provinces of Jean, Cordova, Sevilla; and forming the boundary for about ten miles between the provinces of Huelva and Cadiz, falls into the Atlantic at San Lucar de Barrameda, after a course of about 360 miles. The principal towns upon its banks are Montoro, Cordova, and Sevilla, to the last of which, about 80 m. above its mouth, the river is navigable. Below Sevilla it twice divides itself into two branches, forming two islands—the Isla Menor and the Isla Mayor. Its chief affluents are the Gadajos and the Jenil on the left, and the Guadalimar and the Guadiato on the right. The lower course of the Guadalquivir is sluggish and dreary in the highest degree; the stream itself is turbid and muddy, and eats its way through an alluvial level given up to herds of cattle and to aquatic fowls. There are no villages in this district, which, though favorable to animal and vegetable life, is fatal to man, from the ague and fever caused by the numerous swamps. There is no great trade on the Guadalquivir; foreign vessels are generally moored at the Isla Menor, and their cargoes sent up to Sevilla by means of barges.

GUADALU'PÉ, a river of North America, rises in the southern section of the state of Texas, and flows in a south-eastern direction, emptying its waters into Espiritu Santo Bay, after a course estimated at about 250 miles. The geography of this stream and its capabilities are not yet well-known.

GUADALUPE, a co. in s. central Texas, on the Guadalupe river, crossed by the Galveston, Harrisburg, and San Antonio railroad; 750 sq.m.; pop. '70, 7,282—2,534 colored. A large part is yet covered with forests. The soil is fertile; chief productions: cotton, corn, cattle, and pork. Co. seat, Seguin.

GUADALUPE MOUNTAINS, between the Pecos and the Rio Grande, in New Mexico and Texas, united on the n. to the Rocky mountains.

GUADALUPE-Y-CALVO, a t. of Mexico, in the state of Chihuahua, and 170 m. s.s.w. of the town of that name, is situated in a mountainous district, in close vicinity to several important silver mines. Pop. 10,000.

GUADELOU'PE, one of the Lesser Antilles in the West Indies, and the most important of those which belong to France, lies in lat. 16° n., and long. 61° 45′ w., and contains 500 sq.m., with a population (including dependencies) in 1874 of 167,344, of whom three-fourths are colored. It is divided into Grande Terre on the e., and Basse Terre or Guadeloupe proper on the w., by a strait of about 40 yards in width, which under the name of Salt river, is navigable for vessels of 50 tons. The nomenclature of the separate islands is apparently out of place, for of the two, Basse Terre is the loftier, and Grande Terre is the smaller. Grande Terre, generally low, is of coral formation; Basse Terre, on the contrary, is traversed by volcanic mountains, which culminate in La Suofrière (the "Sulphur Mine") to the height of 5,108 feet. Though this range shows no regular crater, yet it emits, by several orifices, columns of smoke, and even sparks of fire. In addition to these symptoms of subterraneous action, may be mentioned a boiling spring and frequent earthquakes. Basse Terre, on the island of its own name, is the chief town, having an indifferent harbor. Connected with Guadeloupe, as dependencies, are the neighboring islets of Desirade, Marie, Galante, Les Saintes, and the n. part of St. Martin. In 1870 the exports to France amounted to 24,900,000 francs, and the imports from France to 9,800,000 francs. In 1848 slavery was abolished by a decree of the French republic. The island was discovered by Columbus in 1493; but it was not before 1635 that it was colonized by the French; and after repeatedly falling into the hands of England, during her wars with France, it was at length permanently ceded to the latter power in 1816.

GUADIA'NA (anc. *Anas*), one of the longest but at the same time the narrowest and poorest in volume of the five great Spanish rivers, rises on the western boundary of Murcia, about 8 m. n.w. of the town of Alcaraz. From its source it flows n.w. for about 30 m., after which it disappears among swamps; flows underground in a westward direction for nearly 30 m.; and rises again at Daymiel, after throwing up in its subterraneous course numerous lakes called *Los ojos* (the eyes) *de la Guadiana*. From Daymiel it pursues a westward course through La Mancha and the province of Estremadura, until, passing the town, of Badajoz, it bends southward, and flows in that direction, forming for about 35 m., the boundary between Spain and Portugal. Near the town of Monsaras it enters the Portuguese territory, and flows through the eastern district of the province

of Alemtejo. Finally, turning eastward, and again forming the international boundary for about 30 m., it enters the Atlantic below the town of Ayamonte. It is about 520 m. in length, and is navigable only for about 35 miles. Its chief affluents are the Giguela on the right, and the Javalon and Ardila on the left.

GUADIX, a city of Spain, in the province of Granada, on the n. slope of the Sierra Nevada and the river Guadix, 42 m. e.n.e. of Granada; pop. 10,154. It is said to have been the first bishop's see in Spain. It is inclosed by walls and contains the ruins of a Moorish castle and a cathedral. The Moors made strong defense here until 1489.

GUA'DUAS, a city of the United States of Colombia, is situated in that portion of the republic which belongs to South America. It stands near the e. or right bank of the Magdalena, high among the Andes, and is one of the most elevated towns on the globe, being 8,700 ft. above the level of the sea. It contains about 4,000 inhabitants.

GUAIA'CUM, a genus of trees of the natural order *zygophyllaceæ*, natives of the tropical parts of America, having abruptly pinnate leaves, and axillary flowers on one-flowered stalks, often in small clusters. The flowers have a 5-partite calyx, 5 petals, 10 stamens and a tapering style; the fruit is a capsule, 5-angled and 5-celled, or the cells by abortion fewer, one seed in each cell. The trees of this genus are remarkable for the hardness and heaviness of their wood, generally known as *lignum vitæ*, but sometimes as *guaiacum wood*, and sometimes as *Brazil wood;* as well as for their peculiar resinous product, *guaiacum*, often but incorrectly called *gum guaiacum*. The species to which the commercial lignum vitæ and guaiacum are commonly referred, is *G. officinale*, a native of some of the West India islands, and of some of the continental parts of America; a tree sometimes 30 or 40 ft. high, with two or three pairs of ovate, obtuse, and perfectly smooth leaflets, pale blue flowers, a furrowed bark, and generally a crooked stem and knotted branches. It seems probable, however, that other species, as well as this, supply part of the guaiacum wood and resin of commerce. At present they are obtained chiefly from Cuba, Jamaica, and St. Domingo. The wood is imported in billets about 3 ft. long and 1 ft. in diameter, of a greenish-brown color. This is the color of the heart-wood, the sap-wood is pale yellow. Guaiacum wood is remarkable for the direction of its fibers, each layer of which crosses the preceding diagonally; annual rings are scarcely to be observed, and the pith is extremely small. It sinks in water. It is much valued, and used for many purposes, chiefly by turners; ships' blocks, rulers, pestles, and bowls (see BOWLS) are among the articles most commonly made of it. When rubbed or heated, it emits a faint, disagreeable aromatic smell; its taste is also pungent and aromatic. Shavings and raspings of the wood are bought by apothecaries for medicinal use. The bark is also used in medicine on the continent of Europe, although not in Britain. The virtues of both wood and bark depend chiefly on the resin which they contain, and which is itself used in powder, pill, and tincture. It is an acrid stimulant, and has been employed with advantage in chronic rheumatism, in chronic skin diseases, in certain cases of scanty and painful menstruation (and hence it is occasionally an effectual remedy in cases of sterility), and in chronic catarrh. It has also been highly praised as a preventative of gout. The resin is an ingredient of the well-known *Plummer's pills*. In the 16th and 17th centuries, guaiacum was the remedy most in repute for syphilis. The resin sometimes flows spontaneously from the stem of the guaiacum tree; it is sometimes obtained artificially. It is of a greenish-brown color, and has a brilliant resinous fracture. It has scarcely any taste, but leaves a burning sensation in the mouth. One of its most striking characteristics is, that it is colored blue by its oxidizing agents. It contains *guaiacic acid* ($HO,C_{12}H_7O_5$), which closely resembles benzoic acid, and yields on distillation, certain definite compounds known as *guaiacine, pyroguaiacine,* and *hydride of guaiacyl*.

GUAICURÚS, Indians of Brazil, near the river and country of Paraguay. They are a hardy race, living mainly by raising cattle. They know little of agriculture, and subsist on fish and other animal food, and wild fruits. They have ranks of slaves, warrior, and a ruling caste. They have the hideous practice of deforming the under lip by inserting in it a piece of wood as large as the palm of a man's hand. The women are hardy, and assist in the chase and fishing.

GÚALEYGUACHÚ, a city in the Argentine republic, on the river of the same name, 120 m. n. of Buenos Ayres, in the province of Entre-Rios; pop. about 25,000. It stands on the right bank of the river, and is the center of export for the e. part of the province. A large trade is carried on in beef, hides, tallow, wood, and other animal products; and there are important salting and packing establishments in the vicinity, supplied by the vast herds and flocks of the region.

GUAM. See GUAHAN.

GUAMANGA. See HUAMANGA, *ante*.

GUAN, or YACOU (*Penelope*), a genus of large gallinaceous birds of the family *cracidæ*. They have a naked skin on the throat capable of being inflated or swollen, and a naked space around each eye. The name guan more particularly belongs to *penelope cristata*, a species of which the entire length is about 30 inches. It is a native of the forests of Brazil and Guiana, and has been long domesticated in South America. It has been found to endure the climate of Britain and of Holland so well, that hopes

are entertained of its becoming common in the poultry-yards of Europe. Its flesh is much esteemed.

GUANABACO'A. See HAVANA.

GUANACACHE, a lake or lagoon of the Argentine republic between the provinces of San Juan and Mendoza. It is rather a series of shallow lakes filled with small islands.

GUANACASTE, a province of Costa Rica between the bay of Nicoya on the s. and lake Nicaragua on the n.; a rough and thinly populated country. Though given to Costa Rica on the formation of the republic of Central America, Nicaragua still claims that the province belongs to her.

GUANACO. See HUANACA, *ante*.

GUANAHA'NI, or CAT ISLAND, one of the Bahamas, is generally regarded as Columbus's first discovery in the new world, being presumed to be identical with the San Salvador of the illustrious navigator. Recent criticism, however, appears to have transferred this honor to Watling Island (q.v.), which is about 50 m. to the e.s.e.

GUANAJUA'TO, or GUANAXUATTRO, an inland state of Mexico, in lat. between 20° and 22° n., and long. between 99° 40′ and 120° 40′ w., is bounded on the n. by the states of San Luis Potosi, on the e. by Queretaro, on the s. by Michoacan, and on the w. by Xalisco. It has an area of 11,400 sq.m., and a population in 1873 of 730,000. The surface, a portion of the lofty plateau of Anahuac, has an elevation of 6,000 ft. above sea-level, and is traversed by chains of mountains, among which those of Santa Rosa are porphyritic, and present elevations of 11,400 ft. in height. The state is watered by no river of consequence. The soil is fertile; maize, wheat, and frijoles (beans) are the chief grain crops raised; the vine, the *chili colorado*, or red pepper, and the olive, are also largely cultivated. Among the valuable mineral products of the state are silver, iron, lead, and copper, the first in the greatest abundance. The manufactures are woolens, cottons, leather, earthenware, and refined sugar. The climate is mild and pure. The population of the state divides itself into three races—25 per cent of the whole being whites, 39 per cent Indian, and 36 per cent mixed.

GUANAJUATO, or SANTA FÉ DE GUANAJUATO, a city of Mexico, capital of the state of the same name, is irregularly built on an extremely uneven district of hill and valley, in lat. 21° n., and long. 100° 50′ w. The streets are steep and tortuous, but the houses are generally well built, and have gayly painted outsides, green being the favorite color. It contains many fine public buildings, the chief of which are the cathedral, the monasteries (eight in number), the college, the gymnasium, the theater, and the mint. Guanajuato stands in a district in which, within a circuit of five leagues, there are upwards of 100 mines. Pop. 63,000.

GUANAPA'RO, a river of Venezuela, in South America, rises in the department of Caraccas, and, after an easterly course of 230 miles, joins the Portuguesa, which again, through the Apure, sends its tribute to the Orinoco.

GUANA'RÉ, a river of Venezuela, in South America, is an affluent of the Portuguesa, See GUANAPARO. On its banks are two towns, both of which derive their names from it: Guanarito, an inconsiderable place; and Guanare, a city of 12,000 inhabitants.

GUANCABELI'CA. See HUANCAVELICA.

GUANCHES, the name of the inhabitants of the Canary islands found there by the early European discoverers, reported to have been uncommonly tall and well shaped, with straight, dark hair. Before the 16th c. closed they had all disappeared. It is not known where they came from, but some suppose them to have been Libyans driven from Africa by the Moors.

GUA'NINE is a yellowish-white amorphous substance, which derives its name from its being a constituent of guano; it, however, also forms the chief constituent of the excrement of spiders, has been found attached to the scales of fishes—the bleak, for example—and seems to be a normal constituent of the mammalian liver and pancreas.

Guanine belongs to that class of bodies which were formerly called bases, but which, from their combining equally with acids, bases, or salts, are now often termed amides or amide-like compounds.

By oxidation with permanganate of potash, it is converted into urea, oxalic acid, and oxyguanine, a substance not yet sufficiently studied.

With regard to its occurrence in guano, as it has not been found in the recent excrement of sea-birds, there is every reason to believe that it is formed by slow oxidation (from atmospheric action) of the uric acid, much as uric acid can be made to yield urea and oxalic acid. And in the pancreas and liver it probably represents one of those transitory stages of disintegrated nitrogenous tissues which are finally excreted by the kidneys in the more highly oxidized form of urea.

GUA'NO (derived from the Peruvian word *huano*, dung) is the excrementitious deposit of certain sea-fowl, which occurred in immense quantities on certain coasts and islands where the climate is dry and free from rain. Although the use of guano as a manure is comparatively recent in this country and in Europe, its value in agriculture was well known to the Peruvians long before they were visited by the Spaniards. We learn from

the *Memoriales Reales* of Garcilaso de la Vega, published in 1609, that in the times of the Incas no one was allowed, under pain of death, to visit the guano islands during the breeding season, or, under any circumstances, to kill the birds which yield this substance; and that overseers were appointed by the government to take charge of the guano districts, and to assign to each claimant his due share of the precious material. Alexander von Humboldt first brought specimens of guano to Europe in 1804, and sent them to Fourcroy, Vauquelin, and Klaproth, the best analytical chemists of the day.

Mr. Nesbit, in a useful little pamphlet entitled *The History and Properties of the Different Varieties of Natural Guano*, remarks that the quality and value of these manures, commercially, depend almost wholly upon the amount of decomposition to which they have been subjected by the action of the atmosphere. The fæcal matter of the fish-eating birds, which, by its long accumulation, forms the guano deposits, consists essentially of nitrogenous and phosphatic compounds, the former being chiefly ammonia salts derived from the decomposition of the uric acid and urates which exist in the fresh excrements of these birds. The ammoniacal portion of these deposits, and some of the phosphates, are tolerably soluble in water, and are readily washed away by rain. The late prof. Johnston remarked, that "a single day of English rain would dissolve out and carry into the sea a considerable portion of one of the largest accumulations, and that a single year of English weather would cause many of them entirely to disappear." In dry climates, where very little rain falls, as in some parts of Bolivia and Peru, on the western coast of South America, the dung deposited suffers very little from the action of the atmosphere, and retains nearly the whole of its soluble nitrogenous and phosphatic compounds. Guanos, on the other hand, found in regions where rain falls freely, lose a great part of their soluble constituents, but remain rich in their less soluble constituents—the phosphates of lime and magnesia. Mr. Nesbit divides guanos according to their composition, into three classes: 1. Those which have suffered little by atmospheric action, and which retain nearly the whole of their original constituents, such as the Angamos and Peruvian guanos. 2. Those which have lost a considerable portion of their soluble constituents, such as the Ichaboe, Bolivian, and Chilian guanos. 3. Those which have lost nearly all their ammonia, and contain but little more than the earthy phosphates of the animal deposit. Many of these are largely contaminated with sand. In this class we place the various African guanos (excepting that from Ichaboe), West Indian guano, Kooria Mooria (islands off the coast of Arabia) guano, Sombrero guano, Patagonian guano, Shark's bay guano (from Australia), etc.

Most of the so-called Peruvian guano has been obtained from the Chincha islands, which are three in number, and are situated about 12 m. off the coast of Peru, between 13 and 14 degrees s. lat. Each of these islands is from 5 to 6 m. in circumference, and consists of granite covered with guano, in some places to a height of 200 ft., in successive horizontal strata, varying in thickness from 3 in. to a foot, and in color from a light to a dark brown. Sometimes, however, is found a vertical surface of upwards of 100 ft. of a perfectly uniform appearance. If Humboldt's statement is correct, that "during 300 years the coast-birds have deposited guano only a few lines in thickness," the extreme age of the lower strata becomes at once obvious.

The following table represents the mean of 78 samples of Peruvian guanos, analyzed by Mr. Way:

Moisture	13.67
Organic matter and salts of ammonia	52.05
Earthy phosphates	22.78
Alkaline salts containing 3.34 phosphoric acid, and equal to 6.89 soluble phosphate of lime	9.67
Sand, etc.	1.83
	100.00
Ammonia, per cent.	16.52

The following, from Muspratt's *Chemistry* gives the mean of several analyses of the inferior kinds of guano, the first four belonging to Nesbit's second class, and the remaining three to his third class:

	Ichaboe.	Ichaboe.	Chilian.	Bolivian.	Patagonian.	Kooria Mooria.	Saldanha Bay.
	Earlier cargoes.	Recent cargoes.					
Moisture	27.3	20.0	20.4	10.0	25.0	18.1	20.0
Organic matters and salts of ammonia	34.3	24.4	18.6	21.6	18.3	12.4	14.9
Earthy phosphates	30.3	20.4	31.0	51.5	44.0	42.7	56.4
Alkaline salts	5.0	6.2	7.3	14.1	2.1	4.2	5.8
Carbonate of lime						4.1	
Sand, etc	3.1	29.0	22.7	2.7	10.6	18.5	2.9
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ammonia per cent.	7.3	6.0	5.47	4.5	2.5	2.05	1.47

The nitrogen in these analyses is calculated as ammonia for the purpose of comparison. In reality, it exists in various forms of combination—viz., as uric acid, urea occasionally, urate, oxalate, hydrochlorate, phosphate, etc., of ammonia, other urates, guanine (q.v.), and undefined nitrogenous compounds. Hence, as may be inferred, a complete analysis of guano is a work of very considerable labor; but as its agricultural value depends mainly on the quantities of ammonia, soluble and insoluble phosphates, and alkaline salts, which it contains, such analyses as those we have given are sufficient for practical purposes, and they are easily made.

As good Peruvian guano sold long at from £11 to £13, and latterly at about £14 per ton, there was a strong inducement to adulterate it. Umber, powdered stones, various earths, partially decomposed sawdust, and other substances, were used for this purpose, and specimens have been sold containing mere traces of the genuine article. Hence it is expedient that large purchasers should either send a sample to a good chemist for analysis, or should cork up or retain a small quantity in a bottle for analysis, provided the crops to which he has applied his guano do not answer reasonable expectation. A chemist is attached to most agricultural societies and clubs, who performs such analyses for a moderate fee. The numerous analyses of prof. Anderson, late chemist to the Highland society, and of other chemists, have had a very material effect in checking the sale of adulterated guano in Scotland. Still, the adulteration of manure, has for some time been rather more common in Scotland than in England. True, guano is not so often adulterated as some other fertilizers; but in England, the rigorous measures adopted by Dr. Voelcker and the royal agricultural society to expose dealers in spurious articles, and to suppress such traffic, have had a very beneficial effect. In Scotland, the agricultural public awakened to the magnitude of the question. Several district analytical associations have been formed throughout the country. With all this machinery in full play, the fraudulent dealer will fortunately find his avocation as stiff work in Scotland as he has latterly discovered it in England.

Such facilities for analysis will to a considerable extent supersede the following ancient yet simple modes of testing the quality of guano. A pretty good idea, however, can be formed of the superiority or otherwise of the samples of guano by these tests:

1. *Test by Drying.*—If the guano, as is generally the case with the Peruvian and Chili varieties, is a uniform powder, weigh out two ounces, spread it on paper, and let it lie for two days in a dry and moderately warm room. What it may then have lost in weight must be esteemed superfluous water. Many sorts of guano are so moist as to lose 20 or 25 per cent of their weight by this gentle drying. If we wish to determine the water with greater accuracy, a smaller quantity of guano should be placed in a shallow platinum capsule, and moistened with a few drops of hydrochloric acid. A heat of 212° may then be applied without loss of ammonia.

2. *Test by Combustion.*—Pour half an ounce of the guano into an iron ladle, such as is used for casting bullets, and place it upon red-hot coals, until nothing but a white or grayish ash is left, which must be weighed after cooling. The best sorts of Peruvian guano do not yield more than 30 or 33 per cent of ash, while inferior varieties, such as Patagonian, Chili, and African guano, leave a residue of 60, or even 80 per cent; and those which are intentionally adulterated, may leave a still larger residue. Genuine guano of all kinds yields a white or gray ash; and a yellow or reddish ash indicates the adulteration with earthy matter, sand, etc.

This test is based upon the fact, that the most important ingredients, viz., the nitrogenous compounds, become volatilized, and escape, when subjected to a sufficient amount of heat. The difference of odor of the vapors evolved in the process, according as we are working with first or third rate guano, must also be noticed. The vapors from the better kinds have a pungent smell like spirits of hartshorn, with a peculiar piquancy somewhat resembling that of rich old decayed cheese; while those rising from inferior varieties smell like singed horn-shavings or hair.

3. The *lime test* affords a ready means of roughly determining the relative quantities of ammonia in different specimens of guano. Put a teaspoonful of each kind of guano, and an equal quantity of slaked lime, into a wine glass; then add two or three teaspoonfuls of water, and mix the substances together with a glass rod. Lime being a stronger base than ammonia, liberates the latter from the ammonia salts contained in the guano; and the better the guano is, the stronger will be the pungent ammoniacal odor which escapes from the mixture. The slaked lime should be preserved in a dry and well-corked bottle, so as to exclude the air.

4. The *hot-water test* affords a simple means of determining the goodness of guano. We may either boil half an ounce of dried guano in 5 or 6 oz. of water, and filter the solution while hot, or we may place the guano on a filter, and continue to pour boiling water over it, until the drops that come through the filter cease to yield any residue when heated to dryness on a glass slip held over the spirit-lamp. As a general rule, the larger the quantity of guano that is dissolved in hot water, the more ammonia salts does it contain, and the better it is. In the best or Peruvian guano, the insoluble residue ranges from 50 to 55 per cent, while in the inferior varieties it may amount to 80 or 90 per cent.

5. The *acid test* serves to detect the chalk which occurs in the Kooria Mooria guano,

and is used as an adulteration for other varieties. Mix the powdered guano with a little water, and add a little hydrochloric acid or strong vinegar. If chalk is present, effervescence from the liberation of carbonic acid occurs.

6. The *weight* affords the easiest test for the purity of guano. According to prof. Anderson, a bushel of pure Peruvian guano should not weigh more than from 56 to 60 lbs.; but according to most authorities it should weigh almost exactly 70 lbs. If heavier than 73 lbs., it is adulterated with clay, marl, sand, or some other impurity.

If the value of a manure be calculated, as is done by Boussingault and other chemists, according to the amount of nitrogen which it contains, one ton of good Peruvian guano is equal to 33½ tons of farmyard manure, 20 tons of horse-dung, 38½ tons of cow-dung, 22½ tons of pig-dung, or 14½ tons of human excrement.

When we consider what guano is—viz., that being the more or less decomposed excrement of fish-eating birds, it consists essentially of the ash constituents of the flesh of fish, together with ammonia salts—we need not wonder that its application to the land as a manure should so largely increase its productiveness, "for guano," says Liebig, "contains not only the mineral elements which a soil must possess to produce corn, but also in the ammonia an indispensable element of food which serves to quicken their action, and to shorten the time required for their assimilation. On many fields, the ammonia in the guano may, if the weather prove propitious, possibly affect the assimilation of double the ordinary quantity of these mineral constituents, and thus render the amount of produce yielded in one year equal to what would have been otherwise obtained in two years by these mineral matters alone."

The introduction of guano into this country as a manure is comparatively recent. In 1840 only 20 casks of it were imported. In 1841 the earl of Derby—then lord Stanley—spoke strongly in its recommendation at the Liverpool meeting of the royal agricultural society of England; and from that time it has come rapidly into use, as may be seen by the following table of imports:

Years.	Tons.	Years.	Tons.
1841	2,881	1852	129,889
1842	20,398	1854	235,111
1843	30,002	1855	305,061
1844	104,251	1857	288,362
1845	283,300	1858	353,541
1846	89,203	1859	84,122
1847	82,392	1860	141,435
1848	71,414	1865	257,393
1849	83,438	1867	192,308
1850	116,925	1870	280,311
1851	243,014	1877	152,989

As the chemical composition of natural guano is known, an artificial guano may be readily compounded by the admixture, in due proportions, of its constituents. The following mixture, recommended by the late prof. Johnston, forms one of the best imitations of guano, 132½ lbs of it being equal in power to 1 cwt. of good Peruvian guano: Mix 78¾ lbs. of bone-dust, 25 lbs. of sulphate of ammonia, 1¼ lbs. of pearl-ash, 25 lbs. of common salt, and 2½ lbs. of dry sulphate of soda. All these materials, excepting the bone-ash, may be procured from any druggist.

Guano was largely used for all the cultivated crops on the farm, and is yet, as far as it can be procured. Being a high-priced, but concentrated and powerful fertilizer, in ordinary farm-management it is applied with more economical results to some crops than to others. On grasses proper, it is sown broadcast in the early part of spring, when vegetation begins to start. At this time the roots take it up, and prevent it from being washed out of the soil. Clover, on the other hand, being a deep-rooted plant, is supposed by some to be best dressed with it in autumn, before vegetation is stopped for the season. The roots store up the active principles of the manure till spring, and the plants are in a far more vigorous state for the summer growth. From two to three cwts. of guano per acre is the common allowance for grasses intended to be cut for hay, but the Italian variety of ryegrass will sometimes bear a large quantity with beneficial results. Guano is rather too soluble to be applied to early autumn sown wheat. It both stimulates the plant too much before winter, and is apt to be partially washed out of the soil with the winter rains. In moist springs, when there are abundance of rains to wash it in, guano forms an admirable top-dressing for winter wheat. For spring sown wheat, and other cereals, no manure has a more powerful influence. The closer that it is put to seed, the better. The common dressing is from three to four cwts. to the acre for cereals. It should be kept in mind, in regulating the quantity, that the stronger the land is, the larger the quantity that can be applied with a prospect of yielding a profit. The same principle should be observed in its use for the turnip crop. As much as from four to six cwts. may sometimes be beneficially applied to early sown turnips on deep and able soils, while two to three cwts., when farmyard manure is given, will in general prove the most economical quantity. Guano is apt to produce too much heat when it is applied in large quantities to late sown turnips, and to prevent the formation of bulbs. In such circumstances, phosphoric manures will often

yield better crops at less expense. When guano is applied to beans or potatoes, they should be also dressed with farmyard manure. Guano does not possess the power of sustaining the healthy growth of these plants on most soils without something else in addition.

Mixed with rough bones, guano is valuable, applied above dung for turnips, and a great deal of it has been so used. Its value as a fertilizer was so highly appreciated, and its use so extensive, that farmers got not a little alarmed and disappointed at the diminution of the genuine Peruvian guano supplies. Agriculturists of necessity betook themselves of late to various artificial substitutes for Peruvian guano, but the results are not generally so satisfactory. Farmers learned, in the spring of 1874, with satisfaction, of the discovery of new guano deposits on the coast of Peru. For the Peruvian government, Mr. M. H. Thierry explored the new deposits, and he estimated the total quantity at 7,500,000 tons. Of seven different places mentioned as containing that deposit, Pabellon de Pica, having 5,000,000 tons, is the principal. Careful analyses made of the new guano on behalf of the government proved it equal in quality to the guano of the Chincha islands.

GUANO, a t. in the province of Chimborazo, Ecuador, 100 m. s.w. of Quito; pop., about 9,000. It has considerable manufactures of woolens, blankets, carpets, etc., and much Peruvian bark is exported.

GUANO ISLANDS. Besides the Chincha islands, on the coast of Peru, there are in the western Pacific numbers of low coral islands which are guano-producing. They are in lat. 3° and 4° s., and long. 155° and 174° west. They are frequented by the usual varieties of tropical birds, and afford large though decreasing quantities of the fertilizing deposit.

GUANONIEN. Under this name, Du Chaillu, in his second volume of travels, entitled *A Visit to Ashango Land*, mentions a great bird of prey, inhabiting the tropical parts of western Africa, hitherto unknown to naturalists, which he thinks may probably rival in size the condor of South America. He failed, however, in all endeavors to procure a specimen, the bird being apparently very wary. He regards it as an eagle, and not as a vulture, and its habits show this conjecture to be probable. The traveler says: "Several times I have been startled in the forest by the sudden cry of anguish of a monkey who had been seized by this 'leopard of the air,' as the natives often call it, and then saw the bird, with its prey, disappear out of sight." On one occasion, he saw a nest of this bird at the top of a gigantic tree, but the young had flown away. At the foot of the tree lay more than 100 skulls of monkeys, of different sizes, some of which must have been formidable animals.

GUAPEY', a river of South America, rises in Bolivia, and joins the Mamore on its way to the Amazon, after a winding course of 550 miles.

GUAPO'RÉ, a river of South America, rises in Brazil, and, after a course of 400 m., unites with the Mamore to form the Madera, an affluent of the Amazon.

GUARA'NA, an article usually dissolved in water as a beverage, or mixed with food; used by the South American Indians. It is astringent and not unpleasant to the taste. It has been used also as a remedy for sick-headache, but although sometimes appearing to afford relief, its efficacy is doubtful. The article is made from the seeds of the *Paullinia sorbilis*, a Brazilian shrub of the order *sapindaceæ*. The dried seeds are reduced to powder, and mixed into a stiff paste and rolled into cylinders, which are then dried, forming a hard brownish mass. The essential crystallizable principle is said to be identical with caffeine, but has received the name of guaranine.

GUARA'NA BREAD is a kind of food prepared by the savages of Brazil from the seeds of a plant supposed to belong to the genus *Paullinia* (natural order *sapindaceæ*), and which has been called *P. sorbilis*. It is in round or oblong cakes, which are regarded in all parts of Brazil as very efficacious in the cure of many disorders, and which contain, besides other substances, some of them nutritious, a considerable quantity of a substance supposed to be identical with theine or caffeine. The Brazilians pound the guarana bread in water, sweeten it, and use it as a stomachic and febrifuge. It is also reputed aphrodisiac.—The genus *Paullinia* contains several species remarkable for their extremely poisonous properties.

GUARANTY, in international law, is where a third nation or potentate guarantees that a party to an international agreement will fulfill its conditions. Such guaranty does not amount to surety, but is only a promise by a third party to use the best efforts to bring about the fulfillment of the agreement in question.

GUAR'ANTY, or **GUARANTEE**, is a contract by which one person binds himself to pay a debt or do some act in case of the failure of some other person, whose debt or duty it is to do the thing guaranteed. The person so binding himself is generally called the surety in England, while the person who is primarily liable is called the principal. Thus, where A borrows money, and B joins as a party in a bill of exchange or a bond to secure the loan, B is a surety. Where B guarantees that certain goods which are supplied to A shall be paid for, he is more usually styled a guarantor than a surety, but the liability is the same.

Such a contract must be in writing, for the statute of frauds (29) Charles II. c. 3) required that no action should be brought whereby to charge the defendant upon any special promise to answer for the debt, default, or miscarriage of another person, unless the agreement or some memorandum or note thereof should be in writing and signed by the party to be charged therewith, or some other person by him lawfully authorized. So that a surety can only be bound by some writing signed by himself or his agent. And lord Tenterden's act (9 Geo. IV. c. 14, s. 6) enacted the same thing as to persons making representations as to the character, ability, or dealings of another, with intent that the latter may obtain credit. In order to bind the surety, there must also be no deceit or misrepresentation used as to the nature of the risk or as to the state of the accounts. If a guaranty is given to a firm, it is not binding after a change in the firm, unless the parties expressly stipulate to the contrary. If the creditor discharge the principal, or even give time, by way of indulgence to him, the surety is released, for he is thereby put to a disadvantage. In general, the creditor can sue either the principal or the surety for the debt at his option. If the surety is obliged to pay the debt of his principal he can sue the principal for the money so paid, and is entitled to have all the securities assigned to him, so as to enable him to do so more effectually.

In Scotland the law is substantially the same as regards principal and surety, or, as they are there called, principal and cautioner; but there are some minor differences, though many of the differences which formerly existed between the laws of the two countries were swept away by the statutes 19 and 20 Vict. c. 97, and 19 and 20 Vict. c. 60. The chief differences now are, that in Scotland it is not necessary to prove any consideration for the contract, though the contract is not by deed; that liability of the surety continues seven years, whereas in England it continues generally only six years —and that the discharge of the surety can be proved only by the writ or oath of the creditor, whereas in England it can be proved by oral evidence. See Paterson's *Comp. of E. and S. Law.*

GUARATINGUETA, a t. in Brazil on the river Parahyba, 120 m. w. of Rio Janeiro; pop. estimated, 7,000.

GUARDAFUI', CAPE (anc. *aromatum promontorium*), the most eastern point of the African continent, and the extremity of an immense promontory stretching seaward in an e.n.e. direction, and washed on the n.w. by the gulf of Aden and on the s.e. by the Indian ocean. The cape is in lat. 11° 50′ n., long. 51° 20′ east.

GUAR'DIA-GRE'LÉ, a small and unimportant t. of s. Italy, in the province of Chieti, 12 m. s.s.e. of the town of Chieti. Pop. 8,776.

GUARDIAN, in English law, is the legal representative and custodier of infants, i.e., persons under the age of 21, and various species are distinguished. Guardian by nature is rather a popular than a legal term, especially when used in reference to a father or mother, who are often called guardians by nature. In its technical sense, it is confined to an ancestor who is said to be guardian of his heir-apparent. *Guardian for nurture* is the name given to a father, or, after his death, to the mother, who, as such, has the custody and control of children until the age of 14. *Guardian in socage* is the term anciently given to the next of blood who had the legal custody of the person as well as estate of the heir to lands which descend in socage or freehold, until the heir attains the age of 14. A father may, by deed or will, appoint a guardian to his child. If he do not, the lord chancellor will do so; but practically, this is only done when the child is entitled to property. When a guardian is appointed by the chancery division of the high court of justice, the infant is called a ward of court, and requires the sanction of the guardian for most purposes, and requires the permission of the court to marry, or if the infant marries without such permission, those who were privy to such a contempt of court may be punished. A *guardian ad litem* is a person (usually the father, if alive) appointed by the chancery division for the purpose of carrying on a suit in the name of an infant. In general the power of a guardian extends to the person as well as the property of the infant; but in the case of guardians appointed by chancery, their powers are under the strict control of that division.

The guardian of a lunatic (q.v.) is usually called a committee. In Scotland the word "guardian" is sometimes used in reference to lunatics, but seldom applied, except in a popular sense, to those who have the custody and care of children. In corresponding cases in Scotland, the custody of a child under 12, if female, or 14, if male, belongs to her or his tutor (q.v.); and from those ages to 21, the child has no legal guardian, being *sui juris;* but the care of the child's property belongs to a curator (q.v.).

Guardian of the poor is in English parochial law an important functionary, being a person elected by a parish or union of parishes to manage the affairs of the poor. The ancient officers of the parish who attended to the affairs of the poor were called overseers; but by statutes, most of which are recent, it has been thought better to have a larger body of persons elected by the ratepayers of the parish to discharge most of these duties. Hence, many of the larger parishes are, either by a special statute or by order of the poor-law board, put under a board of guardians, and all poor-law unions are managed by guardians also. The ratepayers, in voting, have one vote for each £50 of rent they pay, but in no case are allowed more than six votes. The guardians have the management of the workhouse, and the maintenance, clothing, and relief of the

poor, and in the regulations must comply with the orders of the local government board, whose president is a member of the government, acting by these orders and by statutes. The office of guardian is compulsory, but may be refused, if notice is given during the election.

In Scotland the corresponding duties are discharged by the parochial board (q.v.), which is subject to the general board of supervision. See also POOR.

GUARDIAN (*ante*), one who has lawful care and management of the person, or estate, or both, of an infant during its minority. A guardian by chancery in the United States resides in courts of equity and probate or surrogate courts. The father is guardian by nature, and after his death the mother takes his place. The mother of a bastard is the natural guardian. Guardians by statute are those appointed by deed or will, or those appointed by a court. Testamentary guardians, or those appointed in a will, supersede all others, and have full control of person aud estate until the child arrives at full age. The great majority of guardians are appointed by courts, and their powers are regulated by statute or by common law. Where a mother is living the court need not appoint a guardian. At the age of 14 a minor has a right to choose a guardian, but for sufficient reason the court may disapprove the choice, and the person may then choose again. If a minor has a guardian appointed by a court he may, on arriving at the age of 14, choose another guardian with notice to the one first appointed. A wife may be a guardian, but must have the consent of her husband. The powers and liabilities of guardians (and of wards) are very closely defined by statutes and by the common law.

GUARDIAN ANGEL. This term has long been used to express the idea that human beings are under the special care and protection of certain angels. The notion is supposed to find authority in the words of Christ, Matt. xviii. 10; also in Heb. i. 14.

GUARDS are in all armies the *élite* of the troops, and usually those most heavily armed. In the British service, the guards constitute, in time of peace, the garrison of London, and the guard of the sovereign at Windsor. The guards compose what is called the household brigade, and include in cavalry the 1st and 2d life guards, and the royal horse guards (blue) and in infantry, the grenadier guards, the coldstream guards, and the Scots fusilier guards. These distinguished corps comprise 1302 cavalry in three regiments, and 5,940 infantry in seven battalions. Before the abolition of purchase, the officers of the regiments of foot guards held higher army rank than that they bore regimentally; that is, ensigns ranked with lieutenants of other regiments, lieutenants with captains, captains with lieutenant-colonels; and on exchanging into the line, they were thus enabled to exchange into the higher positions, a circumstance which often placed officers of comparatively short service over veterans of the line, and caused, perhaps, more heart-burning than any other anomaly among our regulations. When purchase was the rule, every officer in the guards was quite ready to accede to it; when it was abolished in 1871, this exceptional rank was also abolished in regard to all officers newly entering the guards.

GUARDSHIP, the ship of war in charge of a port. She generally acts also as a depot for seamen raised there until appropriated to other vessels, and her captain is responsible for the safety and proper preservation of the men-of-war which may be laid up—out of commission in the harbor. The superintendent of a dock-yard, if a flag-officer, carries his flag at the mast-head of the guardship; if he be only a captain, the guardship is usually under his nominal command, although the actual duties are carried on by the commander or next senior officer.

GUAREA, a genus of tropical American trees of the natural order *meliaceæ*, of some of which the bark is used as an emetic and purgative. *G. grandifolia* is called MUSKWOOD in some of the islands of the West Indies; the bark smelling so strongly of musk, that it may be used as a perfume.

GUARI'NI, GIOVANNI BATTISTA, a popular and elegant poet, was b. at Ferrara in 1537. At the termination of his studies in the universities of Pisa, Padua, and Ferrara, he was appointed to the chair of literature in the latter, and soon after, the publication of some sonnets obtained for him great popularity as a poet. At the age of 30 he accepted service at the court of Ferrara, and was intrusted by duke Alfonso II. with various diplomatic missions of delicacy and importance. Differences between him and the duke induced him to withdraw from the court of Ferrara about the year 1587. Having resided successively in Savoy, Mantua, Florence, and Urbino, he returned to his native Ferrara, and discharged one final public mission, that of congratulating pope Paul V. on his election to the tiara. He died in 1612 at Venice, whither he had been summoned to attend a lawsuit. An irascible sensitiveness, joined to an exaggerated estimate of his personal dignity, neutralized many qualities both brilliant and solid, which seemed to fit Guarini exactly for a court career. To these defects, in part, may be attributed the frequent mortifications which tracked him through life. As a poet, he is remarkable for refined grace of language and sweetness of sentiment, while his defects are occasional artificiality, a too constant recurrence of antithetical imagery, and an affected dallying with his ideas. His chief and most popular work, *Il Pastor Fido* (The Faithful Swain), is regarded in Italy as a standard of elegant pastoral compo-

sition, and obtained a high measure of popularity on its appearance. The writer designed it as a tragi-comic pastoral; its first dramatic representation was in honor of the nuptials of the duke of Savoy and Catherine of Austria, 1585. It subsequently ran through forty editions during Guarini's life, and was translated into almost all the modern languages. Tasso and Guarini have been frequently compared; the two poets were literary friends and reciprocal admirers, although rivals in love. Guarini's varied writings, including sonnets, comedies, satires, and political treatises, were published at Ferrara in 1737, 4 vols. 4to.—See *Storia della Letteratura Italiana del Tiraboschi.*

GUARINO (Lat. *Varinus*), a learned Italian, b. at Verona in 1370, went to Constantinople in 1388 to learn Greek under Chrysoloras. After his return he taught in Verona, Padua, and Bologna, was tutor to prince Lionella of Ferrara, acted as interpreter at the council of Ferrara, and died in 1460. He performed great services for the revival of classical studies; translated the first ten books of Strabo, and a portion of Plutarch; commented on Cicero, Persius, Juvenal, Martial, and Aristotle; and wrote a *Compendium Grammaticæ Græcæ*, which was printed at Ferrara in 1509.—Compare Rosmini, *Vita e Disciplina di Guarino* (3 vols. Brescia, 1805–6).

GUARNERI, or GUARNERIUS, a noted family of violin makers of Cremona, Italy. ANDREA, b. 1630, was a pupil of Nicolò Amati, whose work he to some extent imitated. GIUSEPPE, son of Andrea, was an imitator of Stradivarius. PIETRO, another of Andrea's sons, did work much inferior to that of his father. GIUSEPPE ANTONIO, b. 1683, a nephew of Andrea, was a pupil of Stradivarius, and the most celebrated of the Guarneri family. His work was variable, but when at his best, it is doubtful if he had a superior. He was, however, irregular in his life, trifling, and intemperate.

GUASTALLA, a walled t. in n. Italy in the duchy of Modena, the capital of a small district; pop. 10,618. It is on the river Po, 16 m. n. of Reggio; is a bishop's see, and has a cathedral and a public library. There are manufactures of silk.

GUATEMALA, nominally a republic, but really an oligarchic state of Central America, terminates this division of the new continent towards the n.w., being washed at once by the Caribbean sea and the Pacific ocean. It stretches in n. lat. from about 14° to 17°, and in w. long. from 88° to 93°, containing 40,620 sq.m., and 1,190,750 inhabitants. The surface presents great variety, mountains and valleys, plains and table-lands. The different levels, ranging from the sea-shore to an elevation of 5,000 ft., have each its own climate and temperature. The country is subject to earthquakes, and abounds in active volcanoes. Being nearly as populous as all the other states of Central America put together, Guatemala popularly gave name, in the early days of independence, to the confederation which they temporarily formed; and, from the same pre-eminence, it had given name, under the Spanish domination, to a still more extensive region. The government is in the hands of a president elected for four years, with a council of state and a house of representatives. Formerly the president was elected for life, and under Rafael Carrera (1854–65) the government was carried on in the interest of a dissolute aristocracy and a debased priesthood. The banished Jesuits were recalled, the convents re-established, etc. Now a different order of things prevails. A new code of laws has been drawn up; the monastic order has been wholly suppressed; and, though the Roman Catholic is the established religion, others are tolerated. In 1874 the imports and the exports respectively amounted to £610,801 and £657,744, the trade with Great Britain, partly direct and partly through Balize, comprising two-thirds of the former, and nearly three-fourths of the latter. The chief articles imported were cottons, silks, woolens, hardware, ironmongery, linens, and jewelry; and the chief articles exported were cochineal, indigo, sugar, hides, country manufactures, sarsaparilla, and mahogany. Formerly, cochineal was the principal export, in worth more than doubling all the others put together; but of late years, owing to a disease among the cochineal insect, coffee has been the staple.

GUATEMALA (*ante*). The physical features of Guatemala which are of the most practical interest, are its fine rivers, some of which are navigable to near their head-waters, and its lakes which furnish agreeable and salubrious sites for thriving villages. The geology of the country displays some mineral wealth, lead and coal being found in large quantities, while marble quarries and deposits of lithographic stone also are worked to some extent. There are but few animals in Guatemala that are dangerous to man, while it abounds with the usual tropical species, including monkeys, the tapir, the armadillo, honey-bear, etc., besides vast numbers of birds, many of them of brilliant plumage. There are said to be 36 species of humming-birds, 13 of woodpeckers, and 8 of trogons, including in the latter class, the *quetzal*, whose splendid yellow tail-feathers, 2 ft. in length, were used formerly as insignia by the Indian princes, and now form an emblematical figure in the arms of the republic. Alligators, snakes, salamanders, toads and frogs abound, and there is a rich development of insect life. The native products include more than 100 varieties of timber trees; cocoa is grown in the n.w; there is some good tobacco raised, but in small quantities; and vanilla, aloes, rhubarb, ipecacuanha, castor-oil, and colocynth are all indigenous, and only need the intervention of foreign capital to become the material of a valuable export trade. Guatemala is divided into 20 departments, of which that of Guatemala proper is the most populous. Of the

entire population of 1,200,000, 720,000 are Indians, 300,000 Ladinos, and 180,000 whites. In 1874 the number of foreigners was only 829, of whom 191 were Mexicans, 164 Spaniards, 103 Frenchmen, 71 Italians, 64 Germans, and 50 Englishmen. The means of transportation and communication are very imperfect, 1,365 miles of road, with 432 bridges, and one unfinished railroad, and about 400 miles of telegraph being the entire service of this nature in 1874. Guatemala was, in ancient times, the seat of an extended and developed civilization, relics of which exist in numerous mounds, ruins, colossal heads, idols, pillars and altars. Until about 1824, when the Central American confederation was formed, Guatemala was under the Spanish rule. From 1827 to 1851 it was controlled by Honduras and San Salvador. In the latter year Carrera defeated the Hondurians and San Salvadorians at La Arada, and was rewarded by being made president of the republic, a dignity which was in 1854 extended to him for life: his death occurred in 1865, and he was succeeded by gen. Cerna, who was deposed in 1871. In 1872 gen. Bavrios was elected president, and four years later he endeavored to bring about the consolidation of the Central American republics. The effort failed, and a war ensued between Guatemala, Honduras and San Salvador, out of which Guatemala emerged victorious.

GUATEMA'LA, the name of two cities in Central America.—1. Guatemala (old) stands at the foot of Volcan de'Agua, in lat 14° 30′ n., and long. 90° 45′ w. Once the capital of the country, it was twice destroyed, first in 1541, by an eruption, and again in 1773, by an earthquake. Though, after the second disaster, it was supplanted by its more modern namesake, yet it was, to a certain extent, rebuilt. It numbers about 20,000 inhabitants; and many of its ancient buildings, more especially a cathedral, and a palace, remain entire.—2. Guatemala (new), capital of the republic of the same name, is situated in a rich and spacious table-land, at an elevation of 4,961 ft. above the sea, in lat. 14° 37′ n., and long. 90° 30′ west. It is 24 m. to the e.n.e. of the original capital. Population estimated at 45,000. The people manufacture muslins, cotton-yarn, plate, artificial flowers, and beautiful embroidery, carrying on at the same time a prosperous trade in the agricultural productions of the neighborhood. The place is well supplied with water by an aqueduct.

GUATEMOZIN, 1495–1525; son-in-law and nephew of Montezuma, and the last of the Aztec rulers of Mexico. He came to the throne in 1520 just as the Spanish invaders who had been repulsed by Montezuma were preparing another attack. April 28, 1521, the siege of the city of Mexico was begun, and the defenders suffered terrible tortures. The emperor was urged to escape, and tried to do so, but was captured. Cortes was at first disposed to be humane, but finally submitted to the clamor of his soldiers for plunder, and allowed the fallen emperor to be tortured by roasting his feet at a slow fire. He bore the infliction heroically, and the plunderers gained no information concerning the treasure they were after. The emperor was kept a prisoner and with that refinement of cruelty peculiar to the chivalrous Spaniard of the period, Cortes took him along in his raids to compel him to witness the outrages committed upon his people. Finally, on a charge of conspiracy to assassinate the Spanish leader (of which there was not a shadow of proof) Guatemozin and some others were executed.

GUATUSOS, a small tribe of Indians living along the Rio Frio in Costa Rico, supposed by some to be legitimate descendants of the Aztecs, as they have fair complexions and reddish hair. They are extremely reserved, and no white men, not even the persistent Roman Catholic missionary, has explored their country.

GUA'VA (*psidium*), a genus of trees and shrubs of the natural order *myrtaceæ*, mostly natives of tropical America, and some of them yielding fine and much valued fruits. They have opposite entire, or almost entire leaves, a 3 to 5-lobed calyx, 4 to 5 petals, and a 1 to 5-celled berry with many-seeded cells.—The COMMON GUAVA or WHITE GUAVA (*P. pyriferum*) is a low tree of 7 to 20 ft., with numerous branches, obtuse smooth leaves 2 to 3 in. long, and fragrant white flowers on solitary axillary stalks. It is said to be a native both of the East and West Indies, and is now much cultivated in both. It is not improbable, however, that it was introduced into the East Indies from America, but it has now become fully naturalized. Sir James E. Tennent says, it is to be seen in the jungle around every cottage in Ceylon. It has long been occasionally grown as a stove-plant in Britain. The fruit is larger than a hen's egg, roundish or oblong, smooth, yellow; the rind thin and brittle; the pulp firm, full of bony seeds, flesh-colored, aromatic, and sweet. The jelly or preserve made from it is highly esteemed, and is now regularly imported into Britain from the West Indies and South America. The rind is stewed with milk, and is also made into marmalade. This fruit is rather astringent than laxative. Guava buds, boiled with barley and liquorice, make a useful astringent drink in diarrhea. —The RED GUAVA (*P. pomiferum*), also now common in the East as well as in the West Indies, produces a beautiful fruit, with red flesh, but not nearly so agreeable as the white guava. It is very acid. The CHINA GUAVA (*P. cattleyanum*), a native of China, produces fruit readily in vineries in Britain. It is a larger tree than the white guava. The fruit is round, about the size of a walnut, of a fine claret color, growing in the axils of the leaves; the pulp purplish red next the skin, becoming paler towards the center, and there white, soft, subacid, and of a very agreeable flavor. It makes an excellent preserve. It succeeds in the open air in the s. of France.—On some of the mountains of

Brazil grows a dwarf species of guava, called marangaba (*P. pygmæum*), a shrub 1 to 2 ft. high, with fruit about the size of a gooseberry, much sought after on account of its delicious flavor, resembling that of the strawberry.—The BASTARD GUAVA of the West Indies is a species of *Eugenia* (q.v.).

GUAXA'CO. See OAJACO.

GUAYAPE, a stream in Honduras, one of the affluents of the Patuca. For centuries the former stream has been famous for rich gold washings which the natives work in the rudest manner.

GUAYAQUIL', a term of various application in Ecuador, South America, indicates at once a river, a bay, a department, and a city.—1. The river is the only stream on the western coast of South America, which can, without qualification, be said to be navigable for sea-going vessels. It is navigable for about 110 m. to Caracol, and is known in its upper course successively as the Caracol and Babahoyo.—2. The bay which receives the river, stretches in s. lat. between 2° and 4°, and in w. long. between 80° and 81°. It receives also the Daule and the Tumbez.—3. The department extends from the Pacific on the w. to the departments of Quito and Assuay on the e., comprising a much wider belt of low and level land than is generally found further to the s., between the Andes and the sea.—4. The city, the capital of the department, stands on the right bank of the river, at the distance of 40 m. from its mouth. It is divided into two parts, the old and the new. The houses are mostly of wood; the principal are the cathedral, the two hospitals, and the two colleges, the last of which have faculties of theology, philosophy, and law. Guayaquil possesses the best, perhaps the only really good harbor on the Pacific shores of South America, the naturally deep channel being aided by a tide which sometimes rises and falls 24 feet. Occupying such a position, and being in lat. 2° 11′ s., the place is necessarily unhealthy. Still it has a population of 25,000, and carries on an extensive trade. In 1873 (besides the steam-packets), 128 vessels, of 113,034 tons, entered, and 118, of 110,662 tons, cleared the port. In 1870 the imports amounted to £760,500, the exports to £783,000. In 1869 the imports were £405,200; the exports, £504,500. In 1876 the exports were £673,925. The chief articles of import are cottons (more than a quarter of the whole), woolens, wines, spirits, grocery, soap, etc., metals, flour, and linens; and of export, cocoa, straw-hats, timber, bark, hides, orchilla, tobacco, sarsparilla, canes, india-rubber, and coffee.

GUAYAS, a province of Ecuador on the Pacific ocean at the border of Peru; 11,502 sq.m.; pop. '75, 87,427. The soil is fertile with profuse natural vegetation. The climate is excessively hot.

GUAYMAS, a seaport in the state of Sonora, Mexico, on the gulf of California. The harbor is one of the best on the Mexican coast, but the town is otherwise unimportant, having a population of only a few hundreds. There is considerable foreign trade and exports of wheat, hides, etc.

GUB'BIO (ancient *Iguvium* or *Eugubium*), an interesting city in central Italy, is beautifully situated on the south-western declivity of the Apennines, in the province of Urbino, and about 27 m. s. of the city of that name. Pop. 5,350. It contains several fine public edifices of importance. On the most elevated point of the city, where the ancient fortress stood, is the ducal palace, so called from having been erected and inhabited by the dukes of Urbino, who also governed Gubbio. The municipal palace is a noble old pile of building, erected in 1332 by Matteo di Giannello, a native architect. In the palaces of Brancaleone and Beni are valuable pictures, collections of Etruscan and other antiquities. Gubbio possesses several fine churches, and some excellent public establishments for sanitary and educational purposes. The most important ancient remains are the ruins of a theater, supposed to have been destroyed by the Longobards, a temple of Mars, and an Etruscan sepulcher of great antiquity. At a short distance from Gubbio are the ruins of the famous temple of Jupiter Appenninus; and here, in 1444, were discovered the famous Eugubine tables (q.v.).

GU'BEN, a manufacturing t. and river-port of Prussia, in the province of Brandenburg, is charmingly situated on the Neisse—the banks of which are here planted with vines—at its confluence with the Lubst, 28 m. s.s.e. of Frankfort. Except its gymnasium, it has no notable buildings. The principal manufactures are woolen goods and tobacco. The shipping-trade of the Neisse is of some importance; ship-building is also carried on. On the neighboring heights, fruit-trees and vines are cultivated. The red wine produced here is esteemed one of the finest grown in the eastern portion of the kingdom. Pop. '75, 23,738.

GUDGEON, *Gobio*, a genus of fishes of the family *cyprinidæ*, having a short dorsal fin, a short anal fin, and no strong serrated ray in either, the body covered with rather large scales, and barbules at the angles of the mouth. The COMMON GUDGEON (*G. fluviatilis*) is abundant in many of the rivers of England, particularly in such as have gravelly bottoms, and occasional pools and rapids. It seldom exceeds 8 in. in length; the depth is not one-fifth of the length. The tail is forked. The eye is placed high up on the side of the head. The upper parts are olive brown, spotted with black; the under parts white. Gudgeons swim in shoals. They feed on worms, mollusks, and other small animals, and are extremely ready to bite at a bait, which is commonly a small piece of

a red worm. Great numbers are often taken even by young anglers, and the readiness with which the gudgeon is lured has become proverbial. The gudgeon is much esteemed for the table. Many are taken with casting-nets in shallow water, and kept in well-boats till wanted. Fishmongers also keep them in tanks, constantly supplied with fresh cold water. They thrive well in ponds supplied with fresh water by brooks.

The gudgeon is usually one of the first objects of the juvenile angler's ambition; and with a crooked pin and thread, with a fragment of a worm for bait, the angler often imbibes his first love of the art while catching his first gudgeon. The gudgeon is very easily captured. Swimming in large shoals at the bottom, it watches with incessant industry for every trifling matter brought down by the stream. A small red worm is by far the best bait for the gudgeon; next to it, perhaps, a maggot or gentle. A small hook and a light float are required. A fragment of worm is fixed on the hook, neatness in baiting not being a desideratum, for the same bait, without much alteration, will often take ten or a dozen gudgeons in succession. The bait should drag or trip along the bottom; and if there be gudgeons about, it will hardly fail to attract them. Ground-bait is not required for gudgeon; but if the angler will, with a large rake or any other heavy matter disturb the gravel, and rake a clear bright spot, a yard in width, and two or three in length, the gudgeons, attracted by the dislodged particles, will swarm up to the spot in great numbers in search of food; and thus it is no uncommon thing to take by one or two rakings, from five or six to ten or twelve dozen of gudgeons in one spot. There is no art required in the angling as they bite very boldly, and the angler can hardly miss catching them.

GUDIN, JEAN-ANTOINE-THÉODORE, French landscape and marine painter, was b. at Paris, Aug. 15, 1802, and studied for some time under Girodet-Trioson, but soon abandoned the style of this artist, and ranked himself with the romanticists, on the side of Géricault and Delacroix. He first attracted notice by his picture, "Brick en Détresse," exhibited in 1822. Most of his marine pictures appeared at the Paris exhibition of 1855. Between 1838 and 1848 Gudin painted more than eighty of such pieces for the museum of Versailles. Since 1855 he has exhibited many new paintings.

GUE'BERS, GHEBERS, GABERS, GHAVERS (Turk. *Ghiaur* or *Ghaur*), the followers of the ancient Persian religion as reformed and consolidated by Zerdusht (Zoroaster). This name, Guebers, which is commonly, but against all linguistic laws, derived from the Arabic *Kafir* (a word applied to all non-Mohammedans, and supposed to have been first bestowed upon this sect by their Arabic conquerors in the 7th c.), is evidently nothing but an ancient proper name taken from some pre-eminent tribe or locality, since the Talmud (Jebam. 63 b., Gitt 17 a. etc.) already knows them only by this name (Cheber); and Origen (*Contra Cels.* vi. 291) speaks of Kabirs or Persians, asserting that Christianity has adopted nothing from them. They are also called *atesh perest,* or fire worshipers; *Parsees,* or people of Pars or Fars—i.e., Persia; *madjoos,* from their priests the magi; and by themselves *Beh-Din.* "Those of the excellent belief;" or *Mazdaasman,* worshipers of Ormuzd. For the origin, nature, and early history of this religion, see ZOROASTER, ZEND-AVESTA, SUN-WORSHIP. When the Persian empire became subject to the Mohammedan rule, the great mass of the inhabitants were converted to the religion of Islam. A very small number still clinging to the ancient religion, fled into the wilderness of Khorassan, or the island of Hormuz; but even this remnant was for many centuries the victim of constant oppression. Mahmoud the Ghiznevide, Shah Abbas, and others, are conspicuous by their untiring persecution of them; and the manner in which they were held up to general detestation is best shown by the position assigned them in most popular Mohammedan tales as sorcerers and criminals. At this present moment, there are, according to the very latest native information, about 8,000 Guebers scattered over the vast dominions of their ancestors, chiefly in Yezd and twenty-four surrounding villages. There are a few at Teheran, a few at Ispahan, at Shiraz, and some at Baku, near the great naphtha mountain, but all plunged in the depths of ignorance, and with very few exceptions, of poverty. They have a high reputation for honor, probity, obedience to the law, chastity, and endurance. Another portion, after various migrations—which are told at length in the *kissah-i-Sanjan,* written by Behram (1599 A.D.)—reached India, where they are now settled under the name of Parsees, chiefly in Bombay, where they are very numerous, forming a population of above 50,000, or about 8 per cent of the whole population. See PARSEES.

GUEBWILLER (Ger. *Gebweiler*), a t. in the province of Alsace-Lorraine 15 m. s.s.w. of Colmar, on the right bank of the Lauch, at the foot of the Ballon de Guebwiller. The town is well built, has two handsome churches, one built in the 11th c., and the other in the middle of last century. There are manufactures of tapes, ribbons, cottons, woolen cloths, gloves, nails, and refined sugar; there is also an extensive manufacture of spinning machinery. In the vicinity are coal-mines and slate-quarries; good white wine is abundantly produced in the district. Pop. '75, 11,692.

GUELDER ROSE, or GUELDRES ROSE, a cultivated variety of the water-elder (*viburnum opulus*—see VIBURNUM), in which the flowers are all barren, and instead of forming flat cymes, as in the wild plant, form much larger globose corymbs. It is sometimes called the SNOW-BALL TREE. When abounding in flowers, it is a very ornamental shrub, and is therefore very often planted.

GUE'LDERLAND. See GELDERLAND.

GUELPH, the capital of Wellington, a province of Ontario, 48 m. by rail w. of Toronto on the Grand Trunk railroad; pop. 6,878. There is abundant water power from the river Speed, and a large number of manufactories.

GUE'LPHIC ORDER, an order of knighthood for Hanover, instituted by George IV., when prince regent, on Aug. 12, 1815. It is both a military and civil order, unlimited in number, and consisted originally of three classes—knights grand cross, commanders, and knights—to which the revised statutes of 1841 have added another class of simple members. The grand mastership is vested in the crown of Hanover. The badge of the order is a gold cross, surmounted by the Hanoverian crown—between each division of the cross is a lion passant gardant. In the center is the horse courant of Hanover, surrounded by a blue circle, and the motto, *nec aspera terrent.*

GUELPHS AND GHIBELLINES, the names of two great parties, the conflict of which may almost be said to make up the history of Italy and Germany from the 11th till the 14th century. The origin of these names was formerly the subject of much speculation; but antiquarians are now agreed in tracing them respectively to the two families, Waiblinger and Welf, which in the 12th c., were at the head of two rival parties in the German empire, and whose feuds came to be identified historically with the respective principles for which these parties contended. The actual origin of the assumption of the names is commonly fixed at the great battle of Weinsberg, in Swabia, 1140 A.D., in which the two rival claimants for the empire, Conrad of Hohenstaufen, duke of Franconia, and Henry the lion, of the house of Welf, duke of Saxony, rallied their followers by the respective war-cries, "Hie Waiblingen!" "Hie Welf!" but it is certain that the names were in use from an earlier date, although, probably, rather as representing the family feud, than the political principles which the two families afterwards severally supported. As the chief theater of the conflict of these parties was Italy, the original names took the Italian form of *Ghibellini* and *Guelfi.* The former may, in general, be described as the supporters of the imperial authority in Italy, the latter, as the opponents of the emperors; and as the opposition to imperial authority in Italy arose from two distinct parties, which, for the most part, made common cause with each other—from the church, which asserted its own spiritual independence, and from the minor principalities and free cities, which maintained their provincial or municipal rights and liberties—the history of the struggle is involved in much confusion, and is variously related, and its merits variously appreciated, according to the point of view from which it is regarded. To the churchman, it is the struggle of the church against the state; to the friend of popular principles, it is the conflict of liberty against absolutism and centralization. The same individual—as, for example, the poet Dante—is found to change sides in the struggle. For the most part, however, the interests of the church in these mediæval contests, although regarded by Protestants as excessive in degree, must be confessed to have fallen in with the claims of political and personal freedom. Five great crises in the strife of the Guelph and Ghibelline parties are commonly noted by historians: under Henry IV., in 1055; under Henry the proud, in 1127; under Henry the lion, in 1140; under Frederick Barbarossa, in 1159; and in the pontificate of the great champion of churchmanship, Innocent III. The cities of northern Italy were divided between the two parties—Florence, Bologna, Milan, and other cities, as a general rule, taking the side of the Guelphs; while Pisa, Verona, and Arezzo, were Ghibelline. The great Italian families, in like manner, took opposite sides; but the policy of each family frequently varied from one generation to another. In general it may be said that the nobles of the more northern provinces of Italy inclined to the Ghibelline side, while those of the central and southern provinces were Guelph. By degrees, however, especially after the downfall of the preponderance of the German emperors in Italy, the contest ceased to be a strife of principles, and degenerated into a mere struggle of rival factions, availing themselves of the prestige of ancient names and traditional or hereditary prejudices. Even in 1272 Gregory X. could with truth reproach the Italians with their sanguinary animosities for the sake of what were but names, the meaning of which few of them could understand or explain; and, in the following century, in 1334, Benedict XII. practically disallows altogether the reality of the grounds of division between the parties, by prescribing, under pain of the censures of the church, the further use of those once-stirring names, which had long been the rallying words of a sanguinary warfare. From the 14th c. we read little more of Guelphs or Ghibellines as actually existing parties; but in the sense already explained, the conflict of principles which they represent is found in every period of political history.

GUEMAL, a species of deer on the e. coast of South America, by some persons called the "cloven-footed horse."

GUÉRANDE, a t. in the department of Loire-Inferieure, France, 47 m. n.w. of Nantes; pop. 6,749. There is an old castle in the place, and there are manufactures of some importance.

GUERA'RA, or GERRARA, a t. of Algeria in the district of the Beni-M'zab, stands on the left bank of a river called the Zigrhir or Zegerin, in lat. 32° 45′ n., long. 5° e., and about 40 m. n.e. of Ghardaia. It is a walled town, has three gates, and is a favorite

commercial rendezvous for all the neighboring tribes, who frequent this place for the purchase or disposal of horses, asses, sheep, ivory, gold-dust, ostrich feathers, cotton, silk, cutlery, etc. The market of Guerara is supplied chiefly from Tunis and Algiers. The population is about 12,000.

GUERCINO, "the squint-eyed," properly GIAN-FRANCESCO BARBIERI, a celebrated master of the Bolognese school of painting, was b. in 1590 at Cento, a pretty town not far from Bologna. Guercino gave early proof of his intuitive love of art by sketching with the roughest materials on the house-door a "Virgin" so full of artistic promise, that his father, in spite of the straitened circumstances of the family, took immediate measures for training the boy's talents, by securing for him the best tuition in drawing which the place afforded. In 1616 he opened an academy at Cento, to which pupils flocked from all quarters. From 1619 to 1623 he visited different cities of Italy, particularly Rome and Venice, to improve himself by the study of the works of other eminent painters. In 1642 he went to live at Bologna, where he died in 1666. Some of the early paintings of Guercino bear perceptible traces of his admiration of Caravaggio's style, both in their powerful effects of deep coloring and strong fidelity to nature, while they much surpass those of the great realist in dignity and refinement of tone. They are deficient, however, in accuracy of design. His works, which are too numerous for notice, are to be found in the galleries of Rome, Bologna, Parma, Modena, Perugia, and Paris. His master-pieces are considered to be the fresco of "Aurora," which decorates the ceiling of one of the casinos of the Roman villa Ludovisi; the famous "Persian Sibyl," and "Saint Petronilla," both in the Capitoline gallery at Rome. At Cento, the artist's house, *Casa di Guercino*, is carefully preserved, with its fine paintings and fresco decorations, and is the chief object of interest to those who visit the place. The church of Cento also contains several fine works of this master, who had an intense love for his birthplace.

GUERET, a t. in the department of Creuse, France, 37 m. n.e. of Limoges; pop. 4,973. It has a college, hospital, lunatic asylum, and a normal school.

GUERICKE, HEINRICH ERNST FERDINAND, b. Prussia, 1803; a theologian, graduated at Halle, and was made professor there in 1829. He was opposed to the union of the Protestant churches in Prussia. He has published a *Manual of Church History*, *General Christian Symbols*, *Christian Archaeology*, *History of the Reformation*, *Review of Lutheran Theology*, and other works.

GUERICKE, OTTO VON, a celebrated physicist, was b. at Magdeburg, in Prussian Saxony, Nov. 20, 1602. His personal history contains nothing of interest. As a natural philosopher, he is chiefly known by his discoveries regarding the nature and effects of air. The experiments of Galileo and Pascal on the weight of air led Guericke to attempt the creation of a vacuum. His first experiment was made by filling a stout barrel with water, and then pumping out the water; but it was found that no sooner was a vacuum produced in the barrel than the air forced its way through. He now took a globe of copper with an opening at the bottom into which a pump was fitted, provided with a stop-cock, and to his astonishment found that the pump extracted the air quite as well as the water; then, on opening the cock, the air was heard rushing in with a whistling noise. This, the first air-pump, was invented about 1650. Guericke's invention soon became famous, and in 1654 he was summoned to the presence of the emperor Ferdinand III. of Germany at Ratisbon, at which time he made the famous experiment commonly known as the Magdeburg hemispheres (q.v.). He d. at Hamburg, May 11, 1686.

GUERIN, GEORGES MAURICE DE, 1810–39; a French poet, associate of Lamennais. His poems were collected in 1860 in *reliquiæ*. The poet was long taken care of by his sister Eugénie, a woman of remarkable genius, of devout life, and most agreeable style as a writer.

GUE'RIN, PIERRE NARCISSE, Baron, one of the most eminent historical painters of the French classic school, was b. at Paris, May 13, 1774, and first attracted notice by his "Corps de Brutus rapporté à Rome" (1796). Some of his pieces are regarded as master-pieces of the French classic school. The few portraits executed by Guerin are admirable. Among others may be mentioned one of Henri de la Roche-Jacquelin storming an entrenchment. In 1829 he was raised to the rank of baron, and died at Rome, July 16, 1833. Purity of design, dignity of style, taste in grouping, and harmony of color will be generally conceded to Guerin, but the coldness which marks the classic school of painters is as visible in him as in others.

GUERITE, a small loopholed turret in the wall of a fortress, from which a sentry may command a view and fire over the ditch.

GUERN'SEY, the second in size of the channel islands (q.v.), is situated in lat. between 49° 24′ and 49° 30′ n., and in long. between 2° 33′ and 2° 41′ w.; is distant 69 m. s.e. from Start point, in the s. of Devonshire—the nearest point of the English coast; and is about 46 m. s.w. from Cherbourg, in France. Its length is 9 m., its greatest breadth about 6, and its circumference 31 miles. In 1871 it had a pop. of 30,593. The coast is of difficult approach, owing to the number of rocks and the rapidity of currents around the island. The northern part of the island is flat, the southern more elevated, but intersected by deep valleys and glens, and with a lofty and abrupt coast.

St. Peter's, on the s.e. coast of the island, is the only town. For particulars about the climate, soil, productions, trade, etc., see JERSEY.

GUERNSEY, a co. in e. Ohio, intersected by the Marietta, Pittsburgh and Cleveland, and the Ohio Central railroads; 530 sq.m.; pop. '70, 23,838. The surface is moderately hilly, and much of it is covered with forests. Soil fertile; productions: cereals, hay, wool, butter, etc. Co. seat, Cambridge.

GUÉROULT, ADOLPHE, 1810–72; b. France; devoted his life to literature, and became a supporter of saint Simonism. He was consul at Mazatlan in 1842, and at Jassy in 1847; and five years afterwards was chosen chief of the *credit foncier*. He was the chief editor of the *L'Opinion Nationale*, a member of the *corps legislatif*, and a strong opponent of ultramontanism.

GUERRAZZI, F. D., a patriotic Italian statesman and brilliant writer, was b. at Leghorn in 1805, and, educated for the legal profession, won a great reputation among his countrymen by his political fictions, which are said to have exercised an immense influence on contemporary Italian events by their exalted strain of patriotic enthusiasm and abhorrence of despotism. Guerrazzi's own words are, "he wrote a book when impotent to fight a battle." On the eve of the definite breach between the people and the grand duke of Tuscany, in 1849, Guerrazzi was induced to accept office in the ministry. On the flight of the grand duke he was proclaimed member of the provisional government, and subsequently dictator. During this crisis of the state he energetically refused his adhesion to "the substitution of republicanism for monarchy;" and preserved the strict autonomy of Tuscany until the return of the grand ducal rule, when he was immediately seized and imprisoned on the ground of having neglected due measures of repression when the revolution first gathered strength during his ministry. His defense, entitled *Apologia della vita Politica di F. D. Guerrazzi*, or "Justification of the Political Career of F. D. Guerrazzi," is a masterpiece. After an imprisonment of three years, he was condemned for life to the galleys, but was subsequently permitted to select Corsica as the refuge of his perpetual banishment. Restored to liberty and action by later events, Guerrazzi sat in the parliament of Turin in 1862 and 1865. He died in Sept., 1873.

His chief works of fiction are *L'Assedio di Firenze* (the siege of Florence), a magnificent historical novel, treating of the downfall of the republic of Florence; *La Battaglia di Benevento*, remarkable for exquisite expression and beautiful poetic imagery; *Beatrice Cenci; Isabella Orsini; L'Asino;* and various other writings, which have run through innumerable editions and translations.

GUERRERO, a state in w. Mexico along the Pacific coast, between the sea and the Cordilleras; 24,550 sq.m.; pop. 320,069. The surface is rough and interspersed with mountain ridges. The valleys are fertile, and the vegetation is varied and profuse. Beans and corn are among the chief productions, the latter growing three crops in a year. Among other productions are cotton, sugar, coffee, and tobacco. Among the articles of export are cochineal, indigo, wool, and hides. The chief town and seaport is Acapulco, on the Pacific. Cotton and woolen goods are manufactured. A portion of the people are engaged in mining and a considerable number in the pearl fisheries.

GUERRERO, VICENTE, 1770–1831; b. Mexico; a mulatto and once a slave. In the Mexican war for independence he was an able and brave leader of the revolutionists. After the overthrow of the last emperor (Iturbide) he supported the republic. He ran against Pedraza for president in 1827, and was defeated, but two years afterwards when Pedraza resigned Guerrero seized the presidency. One of his first acts was to abolish slavery. When the Spanish invasion came in 1830, Guerrero was made dictator. He defeated the Spaniards, but soon afterwards his chief commanders Bastamente and Santa Anna revolted against him. A long contest followed which was ended by the betrayal of Guerrero to his enemies by a foreign ship captain who had invited him to dine on board his vessel. Guerrero was forthwith shot.

GUERRIL'LAS (diminutive of Sp. *guérra*, "war," literally "petty" or "partisan wars," or "partisan warriors"), the name given in Spain to the armed bands, composed of peasants and shepherds, who, on occasion of foreign invasion of civil wars, carry on an irregular warfare on their own account. From 1808 to 1814 they were regularly organized against the French, and being favored by the character of the country, were successful on many occasions, especially at the commencement of the war, under Empecinado, the Pastor Merino, Mina, and other leaders. The country itself suffered from the guerrillas, who revenged political treachery, or even the bare suspicion of it, by fearful devastations. Many of them, particularly Mina's band, joined Wellington, and after having undergone a course of discipline, rendered signal service as regular troops. In all the recent civil wars of Spain, the guerrillas, especially those of the Basque provinces, acted a prominent part on the Carlist side.

GUESCLIN, BERTRAND DU, Count of Longueville, constable of France, the most eminent French gen. of the 14th c., was born of an ancient family in the district of Rennes, sometime between 1314 and 1320. As a boy he was remarkably dull, and could never be taught either to read or write, but exhibited a passion for military exercises. In his 17th year he bore away the prize at a tournament at Rennes, and from

this time was always successful in such encounters. In the contests between Charles de Blois and Jean de Montfort for the dukedom of Brittany, he took part with the former. After king John had been taken prisoner by the Black Prince at the battle of Poictiers, in 1356, Guesclin rendered important services to the dauphin, afterwards Charles V. He took Melun and several other fortified towns, freed the Seine from the English, and on Charles's accession to the throne in 1364, was created governor of Pontorson. In May of the same year he gained the battle of Cocherel, and was rewarded by the title of count of Longueville and marshal of Normandy. On Sept. 29 he was defeated and taken prisoner by the English, under sir John Chandos, at the battle of Auray, but was liberated on payment of a ransom of 100,000 livres, paid by the king, the pope, and several other princes. He now supported Henry, count of Trastamare, against Pedro the cruel, king of Castile, but was defeated and taken prisoner by the Black Prince. Being again ransomed on payment of a large sum, to which even the enemy contributed from feelings of respect, Guesclin renewed the contest, and in 1369, defeated and slew Pedro, and placed the crown of Castile on the head of Henry of Trastamare. As an acknowledgment of his services, Henry created Guesclin count of Burgos, duke of Molina, and constable of Castile. He was, however, soon recalled by Charles V. of France, at that time hard pressed by the English, and raised by that monarch to the dignity of constable of France. In the year 1370 Guesclin opened his campaigns against the English, and in a short time the whole of their possessions were in the hands of the French, with the exception of a few fortified towns. While assisting his friend Sancerre in the siege of Château-neuf de Randon, in Languedoc, Guesclin was taken ill, and died July 3, 1380. Charles V. caused him to be interred with great pomp beside his own burial-vault at St. Denys.—Compare Guyard de Berville, *Histoire de Bertrand du Guesclin* (Paris, 1767).

GUESS, GEORGE, or SEQUOYAH, 1770–1843; a half-breed Indian, the constructor of the alphabet adopted and still used by the Cherokee nation. He first made an alphabet of 85 characters, representing as many sounds, using as far as possible English letters. A part of the New Testament was printed in this alphabet. Guess went with his tribe from their old home in Georgia to the Indian territory. He died in Mexico.

GUEST, IN LAW. See INN AND INNKEEPER, *ante*.

GUEUX, or "The Beggars," the name assumed by the confederated nobles and other malcontents who opposed the tyrannical policy of Philip II. of Spain in the Low Countries. Philip having sent nine inquisitors to that country to put into execution the decrees of the council of Trent, provoked by this act the bitter resentment of the Protestants, as well as of the Catholics and nobility, who saw in it an attempt to curtail their ancient liberties. A party of opposition was thus formed, and, headed by counts Louis of Nassau and Henry de Brederode, declared in an act called the "compromise," which was remitted (April 5, 1566) to the regent Margaret, their fixed determination to ignore utterly the authority of the inquisitors. On the admission of a deputation from them to an audience, the regent seemed somewhat unnerved by their bold front, and inclined to yield to their demands: when one of her council approached her, and whispered that she "need not be afraid of these gatherings of beggars." The remark having been overheard by some of the deputation, the abusive epithet was assumed as the title of their association. As a sign of fraternity, each of the "beggars" wore a medal called the "beggar's denier," made of gold or silver, and stamped on the obverse with the image of Philip II., and the inscription, "in everything faithful to the king;" and on the reverse with a wallet, such as the mendicant monks carried, held in two hands, with the works, "even to carrying of the wallet." The "beggars" maintained a long and vigorous contest against the despotic proceedings of Philip and his advisers, but were ultimately compelled to succumb to superior force. A branch of them, "the Beggars of the Sea," under the bold leadership of the savage count de la Marck, were almost uniformly successful in their enterprises: they several times defeated the Spanish fleet, captured transports with supplies for Alva's army, captured several fortresses, and succored besieged places along the coast.

GUGGENBÜHL, LOUIS, 1816–63; b. Switzerland, and celebrated as a physician, particularly in the treatment of cretinism. He published several pamphlets and articles on the subject. A retreat for cretins was established by him, but given up after his death.

GUGLIELMI, PIETRO, a celebrated musician and composer, was b. at Massa di Carrara in 1727. From his father, who was *Maestro di Cappella* in the ducal chapel of Modena, he acquired the elements of music. His first opera, composed at the age of 28, was performed at Turin, and was greeted with enthusiasm. Previous to setting out on a continental tour he visited the chief cities of Italy, and was everywhere successful. After a residence of some months at Dresden, Vienna, and various other towns, Guglielmi passed over to London, where he remained five years, assiduously engaged in composition. At the age of 50 he returned to Naples with the double prestige of great fame and wealth. In 1793 pope Pius VI. appointed him *Maestro di Cappela* at St. Peter's, and from that time his official duties seem completely to have engrossed him. He died at Rome in 1804. The characteristics of his style are pre-eminently simplicity,

purity, and precision, and these qualities he inexorably demanded from the exponents of his inspiration—"Sing *my* music and not *yours!*" His best known operas are—*La Clemenza di Tito; Artaserse; La Didone; Enea e Lavinia; La Morte di Oloferne; Debora e Sisera;* and the comic operas *La Virtuosa di Mergellina; I due Gemelle; La Serva Innamorata; La Pastorella Nobile; La Bella Pescatrice.*

GUIA'NA, BRITISH (Fr. *Guyane*, Sp. *Guayana*, Port. *Guianna*), a section of the extensive tract forming the north-eastern portion of South America, lying between 8° 40' n. and 3° 30' s., and between the meridians of 50° and 68° west. The greatest length of this tract, from cape North to the confluence of the river Xie with the river Negro, is calculated at 1090 m.; its greatest breadth, between Punta Barima, at the embouchure of the river Orinoco, and the confluence of the river Negro with the river Amazon, at 710 miles. It is at present politically divided in Venezuelan, British, Dutch, French, and Brazilian Guiana. The name Guiana is usually supposed to have been applied by the Dutch to the whole country from the name of a small river Wai-ini, a tributary of the Orinoco, on which stands a small town, called Guayana Vicija.

The limits of the British possessions have never yet been accurately determined. If we adopt the idea of sir Robert Schomburgk, the latest authority upon the subject, and assume the natural indications to be the proper guide to the geographical boundaries, we shall include all the regions drained by the waters falling into the river Essequibo; and taking the river Corentyn as the acknowledged line of demarkation between British and Dutch Guiana, we arrive at an area of 76,000 sq.m., a territory much larger than England and Wales. If, on the other hand, the claims of the Venezuelan and Brazilian governments respectively are to be admitted, the British portion will be reduced to something above 12,000 m., and become the smallest of the European colonies in this region.

The coast-line of the British territory consists of an alluvial flat, composed of a blue clay impregnated with marine salts, and mixed with decayed vegetable matter, which, in its decomposed state, forms a rich and highly productive soil. The inland depth of this fertile coast varies from 10 to 40 m., where it is bounded by a range of sand-hills, varying in height from 30 to 120 feet. In the fifth parallel n. lat. occurs a chain of mountains composed of granite, gneiss, and trappean rocks, with their various modifications, and it has been conjectured that it was the ancient boundary of the Atlantic ocean. A peculiar feature of the interior is the savannas extending between the rivers Demerara and Corentyn, and at the river Berbice closely approaching the sea-shore. There is another series of such savannas further inland, and the geological structure of the region indicates that it was once the bed of an inland lake, which, by some great elemental disturbance, burst its barriers, and forced for its waters a passage to the Atlantic. This supposition may throw light upon the origin of the tradition of the White sea and the city of the gold-besprinkled Manoa, which inflamed the ardor of the chivalric Raleigh, and led him to the pursuit of those discoveries by which his name has been immortalized.

The fluvial system of British Guiana consists mainly of four great and seven smaller streams, the whole of the first named and six of the latter pouring their waters directly into the Atlantic. The four great rivers are the Essequibo (q.v), the Demerara (q.v.), the Berbice (q.v.), and the Corentyn (q.v.). The smaller streams are the Pomeroon, the Moruca, and the Wai-ini, between the Orinoco and the Essequibo; the Mahaica, the Mahaicony, and the Abany, beteen the Demerara and the Berbice; and the Canje, which joins the latter immediately before it falls into the ocean. In addition to the foregoing, there are numerous creeks of considerable size, formed by the surplus waters of the savannas behind the sea-coast.

All these streams are continually bringing down quantities of detritus; the coast outline is consequently undergoing perpetual changes: in one place, the drainage of the estates is blocked up by banks of drift mud; in another, incessant exertion is required to repel the encroachments of the sea.

Climate.—The climate of Guiana is genial and equable, and for a tropical country comparatively healthy. The thermometer ranges from 90° to 75° F., the mean temperature being 81°.226. The barometric pressure—highest, 30.05 in.; lowest, 29.74; mean, 29.916; average rainfall at Georgetown, 100.50 inches.

History.—Whether Christopher Columbus himself ever actually landed on the shores of Guiana seems not to be positively ascertained. It is, however, certain that the Spaniards must have settled in the neighboring countries early in the 16th c., as in 1580, when the Dutch began to establish themselves on the banks of the Pomeroon and other rivers, they were speedily driven out by the Spaniards, nor was it until 1602 that they succeeded in obtaining a footing on the river Essequibo. During the 17th and the early part of the 18th centuries, the Dutch were frequently harassed by incursions of the French and by internal insurrections: three distinct colonies were constituted, until, in 1789, those of Essequibo and Demerara were united. Berbice remained a separate colony until 1831, when the three were constituted into the colony of British Guiana, consisting of the counties of Demerara, Essequibo, and Berbice.

Towards the close of the 18th c., the feelings of the inhabitants had become strongly influenced by a desire to place themselves under British sovereignty, and in 1796 effect

was given to that desire by the cession of the colonies to an expedition under maj.gen. Whyte. At the peace of Amiens, in 1802, however, the colonies were restored to the then "Batavian republic," to be again surrendered to Great Britain in 1803, which was finally confirmed at the peace of 1814.

Government.—The political constitution of the colony has undergone but little modification since its affairs were administered by the Dutch. It retains peculiarities which distinguish it from that of any other colonial dependency; the principal variations introduced have been the division of the colony into electoral districts; a new definition of the qualification for holding the electoral franchise, and open instead of secret voting. The electors return members of two distinct bodies; one is termed the "college of electors," seven in number, who hold office for life, unless they quit the colony; the special function of this body will be explained hereafter. The other elected body is termed the "college of financial representatives," and consists of six members. The legislative body comprises ten members, five of whom, including the governor, who personally presides over its deliberations, are nominated by the crown, and hold office under it, the remaining five are chosen as vacancies occur by the existing members of the court from a double nomination sent up by the college of electors above described. Once in each year, what is called the "combined court" holds a session for the purpose of agreeing upon the annual expenditure, and determining the nature and amount of the taxes to be levied. This court, which is also presided over by the governor in person, consists of the court of policy "combined" with the college of financial representatives, and its legislative functions are confined to passing the annual tax ordinance. Practically, in the legislative body, or court of policy, the governor is able to carry any measure he desires, possessing, as he constitutionally does, a double vote; but it is hardly necessary to add that this power has been very sparingly resorted to, and the same may be said of the power of vetoing any proposition brought forward either in that or the combined court, should he deem it objectionable. The direct responsibility of the governor to the crown for any and all of his acts, has been found in practice an ample safe-guard against any abuse of these large prerogative powers. Another privilege reserved to the governor is that of originating all money votes; and while the majority in the combined court may reduce, they are prohibited from increasing the amount of any item of the public expenditure as annually settled.

The judicial system of the colony continued until a comparatively recent period, to be as it was established by the Dutch; and the Roman code is still the basis of the administration of justice in civil matters. Trial by jury in such cases, at the option of either party, was introduced in 1844; and in criminal cases, trial by jury was established by law in 1846, and the English criminal code was adopted as the law of the colony.

Besides the supreme and inferior courts, presided over by judges, there are police and stipendiary magistrates in each town and district, with the ordinary powers of summary jurisdiction; a jail in each county, and a penal settlement for the more heinous classes of criminals, situated on the banks of the river Massaruni, about 70 m. from Georgetown. The stipendiary police consists of about 300 men, and there is a strong body of rural constables throughout the colony, consisting usually of the most trustworthy men on the estates, and in the villages, without distinction of races.

There are but two towns, properly so called, in the colony—Georgetown (q.v.) and New Amsterdam (q.v.).

The cultivated portion of the colony is confined to the sea-coast, and to a short distance up each of the rivers Berbice and Demerara. The estates were laid out by the Dutch in the shape of a parallelogram as nearly as circumstances would permit, and the staples were sugar, rum, and molasses, cotton, and coffee. In 1747 two schooners sufficed to carry to Europe the crop of 559 half-hogsheads of sugar; in 1752 the culture of cotton and coffee commenced. Immediately after the conquest by the British in 1796, a great impetus was given to agricultural operations; since that period the fluctuations, arising from various causes at different times, have been considerable, of which some idea may be perhaps arrived at by glancing at the gradual decrease of the numbers of estates in cultivation. In 1831 there were altogether 322; thirty years later there were not more than 160. Cotton and coffee have ceased to be exported; the former is not cultivated, the latter to a very trifling extent. All available resources have been concentrated upon the production of sugar and rum; molasses have much diminished in quantity, owing to the improvement in the manufacture of sugar. By the introduction of improved machinery, and an accession of labor by means of immigration, the produce of many estates has been increased from 50 to 100 per. cent. The timber-trade has become of importance, and for this the colony is mainly indebted to the interest excited in its natural resources by the great exhibitions at London in 1851, and Paris in 1855 and 1878, at which much Guiana produce was exhibited.

It has been ascertained that the population of the colony in the year 1874 amounted to 218,909, inclusive of the aborigines and the troops in garrison. As the increase since 1851 is more than accounted for by the net results of immigration during that period, it seems to follow that the Creole population has rather receded than advanced—a circumstance which, especially as it is belived to be borne out by the experience of some of the smaller West India insular colonies where immigration has had little or no influence, is

matter of serious concern. It is, however, to be remembered, that in the interval the colony has been visited by epidemic cholera and small-pox, both extensively fatal, especially to the aged and the young.

The population is of a diversified character; the aboriginal Indians, who, rapidly becoming extinct, are supposed to number from 7,000 to 10,000, within the British territory; the Creole negro; the mixed race; the immigrants from Madeira, from the East Indies, and from China; with a sprinkling of Europeans, chiefly British, French and Dutch. The immigrants of all races introduced from 1871 to 1874 inclusive, were 27,810. On Dec. 31, 1874, there were 34,360 Indian coolies under indenture; and 14,653 working as ordinary laborers on the estates; 14,883, not indentured, being otherwise employed.

For ecclesiastical purposes, the colony is divided into 17 parishes, of which seven belong exclusively to the church of Scotland, and eight exclusively to the church of England, while Georgetown, in Demerara, and New Amsterdam, Berbice, have ministers of each church appointed to them. The ministers of both churches, with those of the Roman Catholic church and the Wesleyan church, are maintained by salaries from the colonial treasury, secured by law for a term of years. There are also independent missionaries scattered throughout the colony, who are supported exclusively by the voluntary contributions of their flocks. In 1874 the charge for religion amounted to £19,563 19s. 6½d. In the same year public education cost £19,525 18s. 1d., and was reported by the inspector to be in an unsatisfactory state.

The position of this important dependency may be described as one of advancing prosperity; but until a more ample supply of available labor induces a greater influx of capital, it cannot be asserted that its condition is positively satisfactory. Like the other sugar-producing colonies of Great Britain, it has had to struggle against great difficulties—partly, at least, arising from imperial legislation; and it has still to contend with an expensive system of recruiting the deficient labor-market from distant regions.

The statistics of the years 1861 and 1874 show the steady progress of the colony. In 1861 the revenue was £301,761; the expenditure, £325,032; in 1874 they were respectively £603,790 2s. 5d., and £613,798 15s. 10d. The public debt has decreased from £576,499 to £347,264 4s. 10d., with ample security. In 1861 the imports were valued at £1,339,713; in 1874, £1,873,219 9s. In these two years the exports were valued at £1,583,649 and £2,761,837. Sugar, rum, and molasses are the chief exports, and in 1874 had a value of £2,579,246. The trade in valuable native woods—chiefly greenheart—is enlarging, being, in 1871, worth £3,900, and in 1874, £32,418. The imports consist mainly of flour, dried salt fish, rice, malt liquor, brandy, machinery, oils, lumber, pork, and manufactured goods. There are 124 sugar estates, 65 plantain (provision) estates, 78 cattle farms, 16 coffee and 9 cocoa-nut estates. In 1874 there were exported 908,887 hogsheads of sugar, 276,606 puncheons of rum, and 179,625 puncheons of molasses. During the same year 7,615 immigrants from the East and West Indies were added to the coolie population. The criminal statistics for 1874 show a large amount of crime. Out of a population of 218,909, there were 39,965 apprehensions and summonses; and of those convicted there were 17 for murder, 22 for manslaughter, and 7 for attempt of murder.

GUIANA, DUTCH, or SURINAM', lies between British and French Guiana, and is separated from the former by the Corentyn, which forms its western boundary, while the Marony separates it from the territories of the latter, and constitutes its eastern boundary. To the n. it is bounded by the Atlantic, and s. by the Acarai mountain-range, which divides it from Brazil. It extends from 2° to 6° n. lat., and from about 53° to about 57° w. long., and has an area of 45,000 sq. miles. Pop. Jan. 1, '75, 51,834, of whom 713 were Europeans, 464 Chinese, and 3,085 East Indian coolies. The births (in 1874) were 1548; the deaths 3,364.

Although the physical character, climate, and productions are very nearly the same as British Guiana (q.v.), the natural advantages of the colony are not so fully developed, and in the hilly districts in the interior and south, which are held by the Maroons, or runaway slaves, the lands are wholly uncultivated. The rivers all fall into the Atlantic, and the most considerable is the Surinam, which has a course of nearly 300 m., but is not navigable for large ships many miles above Paramaribo (q.v.), the capital, which is built about 10 m. from its mouth. Dutch laws are in force, and the coinage, weights, and measures of the mother-country are generally used. The government of the colony is administered by a governor-general (nominated by the king of the Netherlands) and a general council of native freeholders. All religions are tolerated, and the Jews have synagogues in different parts of the colony. The Moravian missionaries serve 194 plantations, and had, in 1875, 23,576 persons enrolled.

The principal exports are sugar, coffee, cacao, rum, molasses, many sorts of valuable wood, gums, balsams, and drugs. In 1874 the goods imported were valued at £303,781, and the exports at £218,067. Cleared inward, 204 vessels measuring 26,472 tons; outward, 212, with a tonnage of 27,593. Among the exports were 24,135,503 lbs. sugar, 2,435,483 lbs. cacao, 127,460 lbs. cotton, 57,549 lbs. quassia-wood, 1029 lbs. coffee, 201,780 gallons of rum, and 273,159 gallons of molasses.

There were in all 290 plantations with about 30,000 acres in cultivation. The chief product is sugar; then, in order, cacao, cotton, coffee. The live-stock were 3,515 head

of cattle, 208 horses, 82 mules, 250 asses, 1134 sheep, 422 goats, and 1733 swine. The revenue (1874) amounted to £101,984, and the expenditure to the same. The letters by mail were 39,114; newspapers and circulars, 39,551. A bill for the emancipation of the slaves was passed Aug. 8, 1862, and came into force July 1, 1863. The compensation given was £25 for each slave.

The Dutch, who were the first European settlers in Guiana, organized trading stations on the coast as early as 1580, from which period till 1790, when Demerara and Essequibo fell into the hands of the English, they retained possession of most of Guiana. The presesent limits of Dutch Guiana were settled by the congress of Vienna.

GUIANA, FRENCH, includes the districts lying between 2° and 6° n. lat., and 51½° and 54½° w. long., and is bounded on the n. by the Atlantic; on the w. by the Marony river, which separates it from Dutch Guiana, and by the little-known districts lying beyond the Rio-Branco; and on the s. and e. by the river Oyapock and the range of the Tamucumaque mountains, which separate it from the empire of Brazil. The area, according to the best French authorities (Block, etc.) is 18,000 square leagues, but the boundary line of French Guiana is not well defined, and has long been a subject of discussion with the Brazilian and Dutch governments. Pop. '72, 24,171. In addition to the continental districts, French Guiana comprises several islands in the immediate vicinity of the coast, the principal of which are Cayenne, in which is situated the capital of the same name, Le Grand Connétable, and Le Petit Connétable. The country is divided into high-lands and low-lands, the former of which commence at the first cataracts of the rivers, and gradually increase in height towards the central districts, which they traverse in a granite mountain-range, which nowhere exceeds an elevation of 1000 feet. The low alluvial lands, which extend from the cataracts to the Atlantic, are at present mostly covered with vast forests, but the soil is well adapted to the cultivation both of grain of every kind, and all the products of tropical vegetation. Among the 20 navigable streams or rivers, the principal are the Marony, lying to the w., and the Oyapock to the e. of Cayenne, the navigation of which is rendered difficult from the numerous cataracts and rapids by which they are obstructed. The overflowing of the rivers gives rise at various points in lower French Guina to swamps or marshy savannas, which are covered with forests of mango-trees and palms, while in other parts lakes are formed, the most extensive of which are those of Mapecucu, Macari, and Mapa.

French Guiana has a rainy season, which lasts with short intermissions from Nov. to June; and the heat is less oppressive than in most places in the West Indies, in consequence of the influence of the trade-winds, which bring with them the temperate moisture of the Atlantic. The thermometer seldom rises above 90° or falls below 75°.

The chief products and exports are choice woods for ornamental purposes, rice, maize, coffee, cacao, sugar, cotton, nutmeg, cloves, and pepper.

French Guiana or Cayenne, which was first occupied by France in 1633, is now divided into 14 communes comprised under the two cantons or districts of Cayenne and Sinnamary, and placed under the command of a governor assisted by a privy council. A recent French budget stood charged with the sum of barely 134,500 francs for ordinary expenses of government in Guiana, and 2,000,000 francs for the penal settlements at Cayenne. The administration of justice is centered in the tribunal or imperial court at Cayenne, the chief town of the province, and is under the jurisdiction of a president, assisted by counsel, auditors, and notaries. There are 9 free elementary schools in the colony, giving instruction to 1100 children, which are under the superintendence and management of the clergy of the Romish church, of which the majority of the population are members, although various forms of faith are tolerated, and supported at the charge of the state.

In accordance with an imperial decree of 1854 Guiana has been made the principal seat of the penal settlements of the mother-country, which are maintained at Cayenne at the national charge. All persons sentenced to eight years' hard labor are condemned, on the expiration of their sentence, to reside for the remainder of their lives in the colony, unless when they are specially pardoned, in which case they are seldom allowed to return to France. Grants of lands, with the restitution of civil rights, may be accorded by the local authorities as a recompense for good conduct; but the discipline is in all cases severe, and the labor heavy and continuous. The mortality among the prisoners is believed to be very great, but the French government does not include the death-rate of Guiana in its otherwise very full tables of mortality.

GUIANA BARK, FRENCH, the bark of *Portlandia hexandra*, also called *Couteria speciosa*, a tree of the natural order *cinchonaceæ*, with opposite ovate leaves, and corymbs of very large purple flowers, a native of Guiana. The bark is esteemed a very powerful febrifuge, and the value of the widely-known medicine, called *Warburg's Fever Drops*, is believed to depend mainly upon it.

GUIB ANTELOPE, or HARNESSED ANTELOPE, abounds in vast herds in w. Africa. Its sides are a dull red with white stripes which at a distance make it look as if wearing a harness.

GUIBERT, JACQUES ANTOINE HIPPOLITE, Count de, 1743–90: a French writer on military tactics. Frederick the great was rather prejudiced against the young writer, but on more intimate knowledge he greatly commended him. Guibert served in high

positions in the French armies, and in 1789 he was member and reporter of the council of administration in the department of war, He retired from public life in 1789. His most important work is his *Essay on Tactics.*

GUICCIARDINI, FRANCESCO, an Italian statesman and historian, was b. of noble parentage at Florence, in 1482. The combined studies of law and literature engrossed his earliest attention, and were cultivated with such signal success, that before he reached the age of 23, he was elected professor of law by the signoria of Florence, and acquired, at the same time, a reputation of great skill as a legal practitioner. His knowledge of international law, and tact in the conduct of public affairs, caused him to be selected in 1512, by the signoria, as ambassador to the court of Ferdinand, king of Aragon. During a period of two years he discharged his diplomatic duties with consummate ability. On his return to Florence he was received with every mark of public approval, and in 1525 was despatched by the republic to receive at Cortona, pope Leo X. This sharp-sighted pontiff at once secured Guicciardini's services, and committed to him the government of Modena and Reggio, and finally of Parma. Clement VII. continued to shower dignities on Guicciardini, and appointed him, with unlimited powers, governor of the Romagna, and finally of Bologna. On the accession of Paul III. Guicciardini resigned all his dignities, and after 18 years of papal service, returned to Florence, where Alexander de' Medici had just been thrust on the citizens as their sovereign by Charles V. On the assassination of Alexander, Guicciardini promoted materially the elevation of Cosmo de' Medici; but meeting with no special favor from that prince, he withdrew from Florence to his villa at Arcetri, where he commenced his famous work, *La Storia d'Italia.* He died in 1540 before its completion. In 1561, 21 years after his death, the first sixteen books of his history were published, and three years later, four additional books appeared. The work is considered a standard of classical historical writing, independent of its value as a minute and faithful record of the period it embraces, from 1490 to 1534. A magnificent Italian edition was published at Freyburg, 1775—1776, four vols. 4to, strictly in accordance with the manuscripts deposited in the Magliabecchi library at Florence, and another at Pisa, 1819, 10 volumes 8vo, edited by Rosini. In 1857-58, there appeared at Florence *Opere inedite di Francesco Guicciardini,* comprising a series of aphorisms and discourses on the Florentine institutions, in the form of dialogue, recovered from the MSS. in the family archives.

GUICCIOLI, TERESA, Countess, 1801–73; the daughter of count Gamba; married when 16 to count Guiccioli who was over 60. She is known to fame from her intimate relations with Byron, the English poet with whom she was associated in 1819–22. Twenty-five years after Byron's death, in her 51st year, she married the marquis de Boissy.

GUICOWAR, or "the Herdsman," the designation of a powerful Mahratta prince, whose dominions at the present time include most of Guzerat (q.v.), with Baroda for capital. The Guicowar originally, as the name denotes, was an officer in the establishment of the rajahs of Satara, the supreme rulers of the Mahrattas (q.v.), and after a time rose high in rank from his military services, being ultimately appointed hereditary second in command of the Mahratta armies, of which the command-in-chief was vested in the family of Sindia. Pelajee, who became Guicowar, in 1721, by predatory excursions gradually acquired authority over Guzerat; and his son Damajee, who succeeded in 1732, still further extended the bounds of this ample dominion. The latter then threw off his allegiance to the Peishwa, but being taken prisoner by treachery, he was compelled to yield one half of his dominions, and do homage for the other half. Annund Rao, who ascended the throne in 1800, was the first prince of the line who had intercourse with the British Indian government; and it is worthy of remark that, down to the present time, the relations of the British with these Mahratta princes have been uninterruptedly friendly. The two powers came into contact on the occasion of a civil war between the reigning prince and an illegitimate brother who aspired to the throne; and in consideration of the aid afforded him by the Bombay government, the Guicowar agreed by treaty to disband his Arab soldiers, and receive a British subsidiary force, Mar. 15, 1802. A treaty of general defensive alliance was concluded April 21, 1805, by which a British subsidiary force is maintained by the Guicowar. In 1816 the Guicowar quarreled with the Peishwa about some districts claimed by each. The Peishwa caused the ambassador of the Guicowar to be assassinated; and his refusal to give up his agent involved him in war with the Calcutta government, which terminated in the annexation of his state. Syajee Rao, who became Guicowar, in 1819, was frequently reprimanded by the British government, and in 1838 part of his state was sequestrated. In 1840 he made his submission, and among other concessions abolished suttee. His successor, Mulhar Rao, inherited the family vices, and in 1873 a commission inquired into his conduct. He was subsequently accused of attempting to poison Colonel Phayre, the British resident, and tried before a commission which disagreed about his guilt; but he was deposed on account of his general misrule, and Gopal Rao, a prince of the Candeish line, was appointed his successor. See BARODA.

GUIDES, in military affairs, are usually persons drawn from the country in which an army is encamped. A sufficient body of intelligent men is collected at head-quarters, to

enable one or more to be sent with every detachment of troops which leaves the camp. A guide should be quick of eye, experienced in the topography of the country, and, above all, faithful. As, however, guides must on most occasions be drawn from the midst of a hostile population, and have probably only a pecuniary interest in serving well, their conduct is always watched with the utmost jealousy, death being awarded as the punishment for the least departure from trustworthiness. Any treason or incompetence on the part of a guide might involve the most disastrous consequences to a whole expedition. In the French army a considerable corps of cavalry and infantry bear the name, but the name only, of "guides." They were first formed in 1744, as a small company of messengers on active service. The number was gradually increased until the time of Napoleon I., who formed them into a guard 10,000 strong.

GUIDO, ALESSANDRO, an Italian poet, was b. at Pavia, in 1650. Literature and poetry engrossed his earliest attention, and to the taste and ability of his first pieces, he owed the notice of the duke of Pavia, whose favor he further secured by the talent he evinced in setting his verses to fine spirited airs of his own composition. In 1685, with the sanction of the duke, he set out to Rome, where his kind patron assigned him apartments in the Farnese palace. He was fortunate enough to obtain the friendship of Christina, queen of Sweden, and composed, at her desire, the pastoral drama of *Endimione*, the princess condescending to be his fellow-laborer in the work. He died at Rome, 1717. The dramas of Guido fail in sweetness and affection, but are interesting and elevated in sentiment. As a lyrical poet Guido ranks very high.

GUIDO ARETINO, so called from his birthplace, Arezzo, was a monk of the Benedictine order, and flourished about the year 1030, but neither the date of his birth nor death is known. He has the reputation of being the inventor of musical notation, and the regenerator of music. The circumstances which led to Guido's invention are differently stated; but the most reliable account seems to be, that on one occasion while chanting with the monastery choir a hymn in honor of St. John, he was struck with the gradual and regularly ascending tones of the opening syllabic sounds of each hemistitch, in the three first verses:

Ut queant laxis	*re*-sonare fibris
Mi-ra gestorum	*fa*-muli tuorum
Sol-ve polluti	*la*-bii reatum, etc.

With the intuitive foresight of genius, he instantly, we are told, comprehended the fitness of these sounds to form a new and perfect system of solfeggio, and forthwith proceeded to mature and systematize this idea. On introducing his new theory into practice among the youthful choristers of the monastery, the experiment proved entirely successful. The fame of Guido's musical invention drew upon him the attention of the pope (John XX.), who invited him to Rome. Guido repaired thither, and obtained a very gratifying reception. The pope himself found pleasure in becoming a student of the new system, under the guidance of its founder and teacher. Ill health, however, compelled Guido to return to the pure and bracing climate of his birthplace, and, re-entering the monastery of Pomposa, he there tranquilly ended his days. Guido has left some interesting writings, explanatory of his musical doctrines, viz., the *Micrologus;* and the *Argumentum Novi Cantus inveniendi.*

GUIDO DE BRES, 1540–1567; b. at Mons. Persecuted for having left the church of Rome, he fled to London, joined the Walloon church, and entered the Protestant ministry. Returning to his native country, he labored earnestly as an evangelist in various parts of France. At the storming of Valenciennes by Noircarmes, Guido, in escaping, was caught, and after an imprisonment of seven years was hanged. The confession of faith which he prepared in 1559, and which was approved by Calvin, he published in 1562 as the *Confession of Faith of the Reformed Church in the Netherlands.*

GUIDON, the standard borne by regiments of light cavalry; it is broad at one end, nearly pointed at the other, and usually of silk.

GUIDO RENI, a celebrated painter of the Bolognese school, was b. at Bologna in 1575, and at first aimed at the somber coarse strength of Caravaggio's creations, but subsequently followed the more refined and ideal school of the Caracci, previous to finally striking out a style for himself. His works are extremely numerous, and the majority reflect a sentiment of fervent spiritualism, more characteristic of the devotion of the early Bolognese school, than of the later spirit infused by the Caracci, the founders of the modern standard of Bolognese art. Guido Reni was unhappily an infatuated gambler, and with the view of replenishing his often-squandered finances, produced with extreme rapidity many inferior works undeserving his name. He died in 1642. Amongst his best productions are, "The Crucifixion of St. Peter," a magnificent work in the Vatican museum; the "Crucifixion" in the church of St. Lorenzo, in Lucina, Rome. The famous portrait long assumed to be that of Beatrice Cenci is probably not from his hand. The "Aurora" of Guido Reni, on the roof of one of the halls of the Rospigliosi palace, is a fresco of world-wide fame, and is considered the greatest of his works.

GUIDO OF SIENNA, a painter of the 13th c., about whose work there is much uncertainty. In the church of St. Domenico in Sienna is a large painting of the virgin and child enthroned, with six angels above, and in the Benedictine convent of the same:

city is a triangular pinnacle, once a portion of the same composition, representing the Savior in benediction, with two angels; the entire work was originally a triptych, but is not so now. The principal section of this picture has a rhymed Latin inscription giving the painter's name as Gu . . . o de Senis, with the date 1221; the genuineness of the inscription is not, however, free from doubt. In the general treatment of the picture there is nothing to distinguish it from other works of the same early period; but the head of the virgin and child are indisputably very superior, in natural character and graceful dignity, to anything to be found anterior to Cimabue. The best informed connoisseurship of recent years concludes that the heads are repainted, and are, as they now stand, due to some artist of the 14th c., perhaps Ugolino da Sienna; thus the claims of Cimabue would remain undisturbed. Beyond this little is known of Guido da Sienna. There is in the academy of Sienna a picture assigned to him, a half-figure of the virgin and child, with two angels, dating probably between 1250 and 1300; also in the church of San Bernardino in the same city a Madonna dated 1262. Milanesi thinks that the work in San Domenico is due to Guido Graziani, of whom no other records remain earlier than 1278 when he was mentioned as the painter of a banner. [From *Encyc. Brit.*]

GUIENNE, the name of one of the 32 provinces into which France, previous to the revolution, was divided. It comprehended the territory now formed by the departments of Gironde, Lot, Dordogne, Aveyron, and portions of Tarn-et-Garonne, and Lot-et-Garonne, and formed with Gascony (q.v.) what was originally the country of Aquitania, of which name Guienne is a corruption. Its earlier history is described under Aquitaine (q.v.).

GUIGNES, JOSEPH DE, b. at Pontoise, Oct. 19, 1721, acquired a great reputation as an orientalist, at a time when the acquisition of eastern languages was a matter of no small difficulty. Chiefly on account of his thorough knowledge of Chinese, he was appointed interpreter for oriental languages in the Bibliothèque du Roi. Guignes died at Paris, Mar. 19, 1800. His great work, *L'Histoire Générale des Huns, Turcs, Mogols, et autres Tartares occidentaux, avant et depuis J. C. jusqu'à present* (Paris, 1756–1758), is a rare specimen of human industry and research, and of which his countrymen are justly proud. De Guignes also contributed a history of Tartary to the new edition of the *Bibliothèque Orientale* of D'Herbelot (1777–1779).—His son CHRÉTIEN-LOUIS-JOSEPH, b. at Paris, Aug. 25, 1759, was also a very distinguished oriental scholar, and published a Chinese dictionary (Paris, 1813), by the orders of Napoleon I. He died at Paris, Mar. 9, 1845.

GUIJAR', or GUIXAR, a lake of Central America, in the n.w. of the state of San Salvador, is 60 m. in circumference, and incloses a large island, which abounds in game, and contains the ruins of what must formerly have been a large town.

GUILANDI'NA, a genus of shrubs of the natural order *leguminosæ*, sub-order *cæsalpiniæ*, having pinnate leaves, and remarkable for the stony hardness of their seeds, the coating of which is so silicious that they are said even to strike fire with flint. The seeds are used for beads and for children's marbles. *G. bonduc* is the best known species, and is of very wide geographic distribution, although, like the rest of the species, growing only in the warm parts of the world. It is called the *bonduc*, and the *nicker tree*, and its seeds, which are often thrown ashore on the coasts of Scotland and Ireland, are called *molucca beans*. The cotyledons are very bitter, and are much used in India for the cure of intermittent fevers.

GUIL'DFORD, a market t., and parliamentary and municipal borough of England, capital of the county of Surrey, is situated in a depression in the North Downs, on the navigable river Wey, 30 m. s.w. of London. Here the Reading and Reigate branch of the South-Eastern railway crosses the direct Portsmouth line. The town consists mainly of one street, running along the steep e. side of the Wey, crossed here by an old bridge of four arches, and is distinguished by a remarkable air of order and cleanliness. Its streets are rich in quaint old gables, overhanging paneled fronts, and long latticed windows. The chief buildings are the castle, a fine ruin, in the early Norman style; archbishop Abbot's hospital, in which reside a master, 12 brothers, and 8 sisters; the church of the Holy Trinity, with several memorable monuments; St. Mary's, an interesting specimen of the transition style, and one of the oldest and most remarkable churches in the county; the grammar school founded by Edward VI.; the town hall; and the corn-market. A county hall and assize court was erected in 1862, and a county hospital in 1863–1866. Guildford is now chiefly famous for its grain-market, the "Surrey wheats" being celebrated. It has paper, powder, and corn mills; breweries, brick-fields, coach-works, and two iron-foundries. Guildford now returns one member to parliament, instead of two, as formerly. Pop. '71, 9,801.

This ancient town is first mentioned by name in the will of Alfred the great, who bequeaths it to Ethelwald his nephew. In the time of the confessor, the town and manor were included among the demesnes of the kings of England. Henry II., John, and Henry III. frequently resided here.

GUILDHALL, an important public building in London, which may be regarded as the town-hall, and is the place of assembly of several courts, as the court of common council, the court of aldermen, the chamberlain's court, etc., and a police-court presided

over by one of the aldermen. The guildhall of London was formerly situated in Aldermansbury. The original building was erected in 1411, but was almost wholly destroyed by the great fire of 1666. In 1789 the guildhall was rebuilt in its present form. The hall proper is 153 ft. in length, 48 in breadth, and 55 in height. It has been famous for centuries for the magnificence of its civic feasts. The first time it was used for this purpose was in 1500 A.D., when sir John Shaw, goldsmith, who had been knighted on the field of Bosworth, gave here the first lord-mayor's feast. These feasts had formerly been held at Ewees's hall.

GUILDS (Sax. *gildan*, to pay). Guilds were originally associations of the inhabitants of particular towns, for promoting the common interest of the fraternity. They are said to be of Saxon origin, but unquestionably similar institutions existed at a very early period among the southern nations of Europe, where they were known by the name of confraternities. In England guilds were in use during the Saxon rule, and several records are preserved of the purposes of these institutions. The Saxon guilds appear to have resembled our modern friendly societies. On condition of a certain payment, the members were entitled to relief in case of sickness, and to protection from violence. At a later period guilds were of two kinds, religious and secular. Both classes retained, as a general rule, the principle of mutual relief to the members in sickness; but the former were established for the performance of works of charity, and for the regular observance of certain religious services; while the main object of the latter was the advancement of the commercial interests of the fraternity. In order to the establishment of a guild, religious as well as secular, it was necessary that it should receive the sanction of the sovereign; and in the reign of Henry II. several guilds were subjected to heavy fines, as having been established without that authority. In London there were a large number of religious guilds. In the reign of Richard II. a guild to the honor of St. George the martyr, consisting of an alderman, master, brothers, and sisters, was established in Norwich; and here, it may be observed in passing, that the term alderman was a name for a chief officer or governor in a guild, whence it was extended to an officer of a burgh on the extension of guilds, as noticed below. It having been an orderly virtuous society for the space of 30 years from its erection, king Henry V. confirmed it by letters-patent under the great seal, made it perpetual, and granted it certain privileges and immunities (Madox, *Firma Burgi*). In like manner guilds were formed in Bristol, Exeter, and other large towns. These guilds, through the munificence of individuals, by degrees amassed considerable wealth. By Henry VIII. the property and revenues of these religious guilds were seized and perpetually vested in the crown.

The most important branch of this subject is that of the secular guilds, or, as they were styled in the s. of Europe, confraternities. These institutions were the germ of the modern burghs or municipal corporations. They consisted originally of the members of some particular trade, united for the purposes of mutual assistance in sickness, and for maintaining the interests of the trade. Thus we have the guild of goldsmiths, of weavers, of cordwainers, of pattern-makers, of spectacle-makers, etc., the names of which are preserved to the present day. Every trade had its separate guild, of which it was necessary that a man should be a member before he was allowed to practice the particular craft. As trade increased in importance, the influence and power of the guilds increased in proportion, until at length the towns or united guilds claimed from the sovereign special rights and privileges—*quod habeant gildam mercatoriam.* The town of Southampton received a charter confirming their liberties as early as Henry II. Liverpool was made a *gilda mercatoria* by Henry III. In the reign of Henry VI., the title used was *communia perpetua*, or *corporata*, which phrase has continued to be used in the modern corporations. This title of *communia* appears to have been borrowed from the continent, where, under the title of communities, the towns at a very early period obtained charters declaring their independence, and bestowing on them extensive privileges.—See Robertson's *Charles V.*, and Madox, *Firma Burgi.*

The exclusive privileges of English and Scottish guilds or corporations are now abolished, as being contrary to public policy; and these associations exist only for mutual beneficiary purposes. Thus, in various boroughs in England, a custom had long prevailed, and by-laws had been made, to the effect that no person, not being free of the borough or of certain of these guilds, should keep a shop for merchandise, or exercise certain trades within the borough; but since 1835, when the municipal corporation reform act (5 and 6 Will., IV. c. 76. s. 14) passed, every lawful occupation is free, notwithstanding any such custom or by-laws. The exclusive privilege of trading in Scotch burghs was abolished by the statute 9 and 10 Vict. 17. For the functions of the dean of guild in Scotch burghs, see DEAN OF GUILD.

GUILFORD, a co. in n. North Carolina, on Deep river, crossed by the Richmond and Danville, and the North Carolina railroads; 650 sq.m.; pop. '70, 23,584—6,698 colored. The surface is undulating, and in some parts has good timber. Corn, oats, tobacco, and pork are the main products. Co. seat, Greensborough.

GUILFORD, a t. in New Haven co., Conn., on Long Island sound and the Shore Line railroad, 16 m. e. of New Haven; pop. 2,576. It has several churches, the Guilford institute, and some manufactories. Fitz-Greene Halleck, the poet, was born here.

GUILFORD COURT HOUSE, a small village in Guilford co., N. C. A battle was fought here Mar. 15, 1781, between the revolutionists under Greene, and the English under Cornwallis. It was not a decisive action, both parties suffering severely, and both declining to renew the attack.

GUILLEMOT *Uria*, a genus of web-footed birds, of the group *brachypterœ* (q.v.) or divers, and included by Linnæus in the genus *colymbus* (see DIVER), but now more generally ranked among the *alcadæ* (see AUK) than among the *colymbidæ* (q.v.). The bill is moderately long, straight, and pointed, as in *colymbus*, but rather more compressed, and covered with feathers as far as the nostrils; the feet, as in the other *alcadæ*, are three-toed, having no hind-toe, and entirely webbed. The legs are placed very far back, and are very short, the tibia scarcely appearing beneath the abdomen, so that they are ill adapted for walking, and the posture of the bird on land is erect, even when hatching its egg. The tail is very short. The wings are short, and are moved with great frequency in flight, which, however, the guillemots are able to sustain remarkably well, in consequence of the abundant provision made for aëration of the blood by their very large air-cavities. On the same account, they usually float very high in the water, though, when danger approaches, they can sink their bodies under water, till the head, neck, and upper part of the back are alone visible. They excel in diving, and use their wings for progression under water, where they seek their food, which consists chiefly of small fishes and crustaceans. They are seldom seen in the seas of warm latitudes, but are extremely abundant in those of the arctic regions and the colder parts of the temperate zone, particularly in the neighborhood of rocky coasts. The COMMON GUILLEMOT, or FOOLISH GUILLEMOT (*U. troile*) is abundant on many parts of the British coasts, breeding even on those of the south of England, although large flocks also arrive in winter from the north. It abounds in all the arctic regions. Its winter migrations extend as far s. as the Mediterranean, and in America to New York. It is called foolish guillemot, from its often suffering itself to be taken by the hand rather than leave the cliffs on which it breeds, and where prodigious numbers may be seen stationed close together on the ledges of rock. The parent birds are said to carry their young on their backs from the high ledges to the water. The entire length of the common guillemot is about 18 inches. The common guillemot lays only one egg, which has a very thick shell, is pear-shaped, and remarkably large, being more than three inches long. If the egg is destroyed or taken away, another is laid in its stead. The egg is esteemed a delicacy, but the flesh of the bird is coarse. The skin with the feathers is used for clothing in some northern regions. Young birds and eggs are among the objects in pursuit of which the rock-fowlers of the northern coasts scale or descend the most tremendous precipices. Great numbers of the eggs are exported from the coasts of Newfoundland and Labrador.—The BLACK GUILLEMOT (*U. grylle*) is a smaller species, about 14 inches long; the plumage entirely black in summer, except a large white patch on each wing; but in winter, the under parts are white; the young are mottled or spotted. It is not common on the southern coasts of Britain, but breeds on many of the Scottish islands. It is plentiful in the arctic regions, and is as common in America as in the old world. It has been called the Greenland dove. It lays three eggs, often on the bare rock; but if the situation is damp, it piles up for them a curious nest of pebbles. Other species are enumerated among British birds, but are rare. Several species are peculiar to the northern parts of the Pacific ocean.

GUILLIM, JOHN, 1556–1621; an English writer on heraldry, educated at Oxford, a member of the college of arms in London. He published the *Display of Heraldry*, a work that passed through many editions.

GUILLOCHE, an architectural ornament of Greek origin. It consists of two or more bands or ribbons, crossing and recrossing one another in a regularly repeating pattern. Some of these are simple and some very complicated.

GUIL'LOTINE, the instrument of decapitation introduced during the French revolution by the convention, and named after its supposed inventor, Josephe Ignace Guillotin, a physician (b. 1728—d. May 26, 1814), who, however, it is ascertained, was only the person who first proposed its adoption. It is composed of two upright posts, grooved on the inside, and connected at the top by a cross beam. In these grooves, a sharp iron blade, placed obliquely, descends by its own weight on the neck of the victim, who is bound to a board laid below. The speed and certainty with which this machine separates the head from the trunk, gives it a great superiority over the axe or sword. The invention of machines of this kind is ascribed to the Persians. In Italy, from the 13th c., it was the privilege of the nobles to be put to death by a machine of this kind, which was called *mannaia*. Conradin of Swabia was executed by such a machine at Naples, in 1268. An instrument resembling the guillotine was likewise employed in Germany during the middle ages. During the 16th, and till late in the 17th c., a machine called the *maiden*, which differed but slightly from the guillotine, was employed in Scotland for the purpose of decapitation. That such an apparatus was known and used in France at an earlier period, is proved by the execution of the Duc de Montmorency, who is described as having been executed by a falling axe at Toulouse, in 1632. The Dutch, too, in the 18th c., employed a decapitating machine in executing slaves in their colonies.

GUILTY is the form of verdict given by a jury in criminal cases when the crime charged has been found proved. In England, there are only two verdicts which can be given in such cases—viz., guilty or not guilty; but in Scotland there is an intermediate verdict, called "not proven," which, though in reality a verdict of "not guilty" (and it is so entered in England), yet is allowed to be given by juries when they are not satisfied that sufficient legal evidence has been given, but nevertheless consider there was some foundation for the charge, or at least some ground for suspicion. It has been objected to this verdict that it leaves a stigma on the party: nevertheless, it is firmly adopted in the law and practice of Scotland.

GUIMARÃES, one of the most ancient, picturesque, memorable, and beautifully situated towns of Portugal, in the province of Entre Douro e Minho, stands within an amphitheater of hills covered with the most luxuriant foliage, between the D'Ave and the Arezilla, 12 m. s.e. of Braga. Its narrow streets, its broad red balconies and verandas, its walls, part of which are now in the center of the town, and are surmounted by pointed parapets, and its remains of ancient architecture seen here and there, render the appearance of the town exceedingly striking. Guimarães was the cradle of the Portuguese monarchy, the residence of count Henriques, and the birthplace, in 1109, of Alfonso Henriques, his son, and the first king of Portugal. Among the most interesting buildings are the cathedral, founded in 1385; the castle, a flamboyant structure, surrounded by square towers; and the Dominican convent, with beautiful cloisters of the 14th century. From every elevation in or near the town, magnificent views are obtained. In the vicinity are the Caldas (hot springs) das Taipas, and the Caldas de San Miguel, both finely situated, and well appointed. These springs, which were well known to the Romans, are used chiefly for bathing purposes. They range in temperature from 91° to 120°, are sulphureous, and are said to be very effective in cases of gout and cutaneous disease. Guimaraes is celebrated for its currieries and its paper manufacture; it also exports great quantities of dried plums and figs to England. Pop. 6,000.

GUINAND, FRANÇOIS, 1745–1825; an optician, native of Switzerland. He was the son of a carpenter, and when young made a telescope after one belonging to his employer, so exact a copy that it was not easy to distinguish one from the other. He then made lenses which attracted the notice of Truenhofer, who at once gave him employment. Later in life he constructed many excellent telescopes.

GUIN'EA, the name of a maritime section of western Africa. It extends from the neighborhood of the Senegal to the vicinity of Cape Negro, the stream being in lat. 16° n. and long. 16° 33′ w., and the headland in lat. 15° 41′ s. and about long. 11° 40′ e.; and by the equator, which thus intersects it, it is divided into Upper or northern, and Lower or southern Guinea. This vast region forms the coasts of the Mandingoes, Ashanti, Dahomey, Benin, Biafra, Loango, Congo, Angola, and Benguela, connecting with the Atlantic even more distant territories by means of its rivers, more especially by the Senegal, the Gambia, the Niger, the Old Calabar, the Zaire or Congo, and the Coanza. Guinea was first visited in 1364 by some French merchant adventurers of Rouen and Dieppe, and first colonized by the Portuguese in 1481, who have retained nominal possession of the whole of Lower Guinea, the chief states of which are Loango (q.v.), Congo (q.v.), Angola (q.v.), and Benguela (q.v.). The Dutch, French, English, Danes, and even the Germans, also established various settlements, or rather factories, particularly in Upper Guinea, the coast of which is now divided into Grain Coast, Ivory Coast, Gold Coast, and Slave Coast. Besides the articles thus designated, the soil yields indigo, pepper, cotton, sugar, and palm-oil. The factories were chiefly established to secure the slave-trade, and after its suppression their commercial importance ceased. Great Britain has ultimately endeavored to make a humane and Christian use of its acquisitions. While keeping a naval squadron off the west African shores to intercept the slavers, it was needful to provide for the liberated cargoes of black men and women. The Sierra Leone (see FREE TOWN and SIERRA LEONE) and Gambia settlements were created for this purpose, and here the Wesleyans have many chapels and schools for the natives. For the American settlement, see LIBERIA and MONROVIA. In 1872 the Dutch gave up to England all their possessions on the Gold coast. In return for this cession, England consented to annul the treaties prohibiting Dutch conquests in Sumatra on the straits of Malacca. But the king of Ashanti (q.v.) immediately laid claim to Elmina, the capital of the former Dutch possessions, and after a series of intrigues and diplomatic complications, invaded (April, 1873) the territory now under the English protectorate. He was at first successful; but the arrival of sir Garnet Wolseley (Oct., 1873), followed by some British regiments, soon changed the aspect of affairs, and the Ashanti king was forced to retire into his own country, and after numerous defeats, had to suffer the humiliation of seeing his capital, Coomassie (q.v.), reduced to ashes, Feb. 6, 1874. By the treaty which followed his submission, the king of Ashanti renounced all claim either of tribute or homage from any of the tribes within the limits of the Gold coast.

GUINEA, GULF OF, a portion of the Atlantic ocean, washes that remarkable bend of western Africa which, reckoning from the n., runs first nearly on a parallel, and then nearly in a meridian. It may be regarded as stretching from Cape Palmas, in lat 4° 22′

n., and long. 7° 44′ w., to cape Lopez, about lat. 1° s., and long. 8° 35′ e. At its n.e. extremity is the delta of the Niger, between the Bight of Benin on the n.w., and the Bight of Biafra on the s.e. Off its e. shore, reckoning, from the n., are the islands of Fernando Po, Prince, and St. Thomas.

GUINEA, a gold coin formerly current in Britain, derived its name from the fact that the gold from which the first specimens were coined was brought from the Guinea coast in w. Africa, and, for the same reason, it originally bore the impression of an elephant. It was first coined during the reign of Charles II., in 1664, and continued in common use till 1817, when it was superseded by the *sovereign* (q. v.). Its value varied considerably at different periods, but was latterly fixed at twenty-one shillings. It is still customary in Great Britain to estimate professional fees, honoraria of all kinds, complimentary subscriptions, prices of pictures, etc., in guineas; to give a physician three sovereigns and three shillings, rather than three sovereigns alone, or even three sovereigns and five shillings, is supposed to make the transaction differ from a mere mercantile one, and thus veils the sordidness which is fancied to attach to pounds, shillings, and pence.

GUINEA CORN, a name sometimes given to Durra (q. v.); sometimes to another cereal grass, *penicillaria spicata* or *pennisetum typhoideum,* very extensively cultivated in central Africa, and to some extent also in India, where it is called *bajree.* It is of the tribe *paniceæ,* and may be regarded as one of the millets. It is a grass with a spike-like cylindrical panicle.

GUINEA FOWL, or PINTADO, *Numida,* a genus of gallinaceous birds of the family *phasianidæ,* having a short, strong bill, the upper mandible vaulted, a warty membrane at the base of the bill, and a wattle hanging down on each side, the head and upper part of the neck generally naked, the forehead surmounted either with a callous or a feathery crest; the back much elevated and arched, the tail short. The species are all natives of Africa and Madagascar. The best known is the common GUINEA FOWL, or PINTADO (*N. meleagris*), with naked head, hard callous casque, and slate-colored plumage, everywhere speckled with round white spots of various sizes. It is common in Guinea, and apparently through all the regions thence to the neighborhood of the cape of Good Hope; it is found also in more northern parts of Africa, and was known to the ancient Romans, by whom it was called *meleagris* and *gallina numidica.* Its flesh was highly prized by them. In a wild state, the Guinea fowl is generally seen in large flocks. It is not so polygamous as many of the gallinaceous birds, and even in a state of domestication, exhibits the inclination to pair. It is now common in the poultry-yards of most parts of Europe, although it is more adapted to warm than to cold climates, and in Jamaica has been completely naturalized, so as to be destructive to crops, and to be shot like other game. In Britain the young are rather troublesome to rear, but the high price borne in the market both by the birds and their eggs, compensates those who keep Guinea fowls for profit. The eggs are small, and have a thick strong shell, but are particularly esteemed. Guinea fowls, however, are troublesome in a poultry-yard, from the disposition of the males to attack and tyrannize over other poultry. The Guinea fowl has a peculiar harsh and querulous cry, which it emits with great frequency. There is a white variety of Guinea fowl.

GUINEA GRASS, *Panicum maximum,* a grass of the same genus with MILLET (q. v.), a native of the west of Africa, but now naturalized, and extensively cultivated in the West Indies and southern states of America. It does not perish even in the winters of Britain, but is not luxuriant and productive, as in warmer climates. Its height in favorable moist situations, is from 5 to 10 ft.; in dry grounds, it is smaller; it has a much-branched and spreading panicle, long flat leaves, and a somewhat creeping root. In countries favorable to its growth, it is very valuable as food for cattle.—Other species of the same genus are among the most useful pasture and forage grasses of tropical countries.

GUINEA PEPPER, a name which has been variously applied to the seeds or dried fruit of several very different plants, agreeing in their peppery character, and in being the produce of the west of Africa. The name MALAGUETTA (malagheta, meleguetta, etc.) PEPPER is generally to be regarded as equivalent with Guinea pepper, and is at present a frequent designation of *grains of Paradise* (q. v.); but the capsules or dry berries of *capsicum frutescens* (see CAPSICUM) are commonly sold by druggists under the name Guinea pepper; whilst both the names Guinea pepper and malaguetta pepper have been applied to the dried fruit of *cubeba clusii* (see CUBEBS), and to the seeds of *habzelia* (or *xylopia*) *Æthiopica,* a shrub of the natural order *anonaceæ.* This last was at one time a considerable article of export from Guinea, and was sometimes called ETHIOPIAN PEPPER. It is now seldom even heard of. It is an aromatic and not extremely pungent condiment.—There is great difficulty in determining which of these kinds is meant in many instances in which the term Guinea pepper or malaguetta pepper is employed by the older writers; yet, from the importance of the trade in this article, the name *Grain Coast* was given to a great tract of land in the Bight of Benin, and to it the establishment of the settlements of Grand Bassa and cape Palmas is due. Up to the close of the 18th c. Guinea pepper continued in request, when the peppers of the east drove it from the market.

GUINEA-PIG. See CAVY.

GUINEA-WORM, known also as *filaria medinensis*, or *F. dracunculus*, is a parasitic animal that seems to have been known from the earliest times. Plutarch, in his *Symposiacon* (Table-talk), quotes a passage from the geographer and philosopher Agatharchides of Cnidus, who lived in the second century before our era, which seems clearly to refer to this worm; and it has been argued with great plausibility, that the "fiery serpents" which attacked the Israelites in the desert were in reality Guinea or Medina worms. This view of the "fiery serpents" was propounded by Bartholin in his commentary, and Küchenmeister, one of our highest authorities on parasitic animals, adduces the following arguments in its support. The Hebrew words which in our version are translated "fiery serpents" are *nechaschim seraphim*, the former word is correctly translated "serpents;" while *seraphim*, derived from the word *saraph*, can signify nothing more than *is qui comburit;* and it is clear that a species of animal is referred to which is distinguished by the inflammability of its bite, or generally by the inflammation which its presence causes. "That in ancient times the Filaria [or Guinea-worm] was reckoned amongst the serpents on account of its snake-like form, is proved at once by the Greek name *drakontion* (Lat. *dracunculus*), a species of snake which had something fabulous and inexplicable about it. The inflammatory pain and swelling which occurred with the breaking out of the worm are certainly very well expressed by *seraphim;* while the mortality amongst the Israelites is easily explained by their ignorance of the treatment, and the dangerous symptoms occurring in consequence of the breaking of the worm, which, according to some authors, may be immediately fatal. Only in the last portion of the way through the desert of Zin towards Mount Hor, but especially on the way from Hor towards Oboth, for which journey they required several months, did the Israelites come into the true district of the Medina-worm—namely, the central and eastern portion of Arabia Petræa. This entire march they would undoubtedly have passed over within the period of incubation of this worm (two months to one year). Here the *Filaræ* (or Guinea-worms) first broke up, with violent inflammatory pains. Thus, then, the Israelites contracted these worms, which are still indigenous in Arabia Petræa; and this worm-province may consequently be of importance and interest to geographers in the determination of the course of travels in the fortieth year of the Israelites wanderings." (*On Parasites*, vol. i. pp. 392–393.)

Our knowledge of the natural history of this worm is still very deficient, and we are at present only acquainted with the female. The body of this animal is slender, cylindrical, and somewhat compressed, and is of the thickness of pack-thread, except at the posterior extremity, where it is somewhat attenuated. It is opaque, of a milk-white color; on each side there is a longitudinal line; and when examined by the microscope, it is seen to be marked with numerous tranverse striæ. The anterior extremity is obtuse, and the mouth circular, and beset with four acute spines (but the number, nature, arrangement, and even existence of these spines are points on which helminthologists differ). The length of the worm varies from less than half a foot to three yards. On examining an adult specimen, extracted by Malgaigne in Paris in 1854, Robin found no trace of intestine, or of any organ except a very thin sheath (a uterus or oviduct), which was filled with young animals rolled up in coils, with the tail occasionally projecting outwards. In these young animals, we can trace the course of the intestinal canal, which apparently becomes subsequently obliterated by the excessive development of the generative organs and the eggs.

This worm is indigenous only in certain hot countries, and its geographical distribution is regulated by laws into which we have no insight. Küchenmeister mentions the following places as especially notorious for its occurrence: Senegal, Gaboon, the banks of the Ganges, Bombay, the peninsula of India, Persia, Arabia Petræa, the s. coast of the Red Sea, the region round the Caspian sea, Upper Egypt, Abyssinia, certain districts of Nubia, and Guinea. It has been introduced into certain parts of America by negro slaves.

The disorder occasioned by these worms frequently becomes an epidemic in years of heavy rain, and especially in marshy districts. It appears also to be connected with the season, being especially prevalent in the East Indies during the rainy season, and in Upper Egypt shortly after the regular inundation of the Nile.

The mode of production of this parasite in the human body is not known with certainty. The probability is, that the young animals, while still very minute, penetrate the skin, although by what mechanism they can effect their lodgment, we do not know. Carter relates a case which strongly supports this view. Fifty children in a school at Bombay went to bathe in a pond, and 21 of them were attacked by the Guinea-worm; some of them having four or five worms. Moreover, it is well known that negroes who are in the habit of entering the water more frequently than the whites, and generally have their feet naked, are far more liable to be attacked than Europeans. The part of the body in which the worm usually manifests itself also accords with this view. M'Gregor states that, in 172 cases, it occurred 124 times in the feet, 33 times in the legs, 11 times in the thighs, twice in the hands, and twice elsewhere.

Having gained an entrance into the body, the Guinea-worm takes a considerable time to be developed. This period varies from two months to a year or even two years. The

presence of the worm often produces no annoyance for a considerable time after it has been detected; at other times, it gives rise to emaciation, and possibly even death from exhaustion. As a general rule, the vesicles caused by the inflammation excited by the presence of the worm open spontaneously in a few days, and two or three inches of the anterior end of the animal come forth. This end is gently pulled, and coiled round a little roll of linen or a small stick, and this is fastened over the wound with sticking-plaster and a compress. The extraction is repeated twice a day by rotating the substance round which the worm is twisted, and the operation is often not completed in less than two, three, or more months. From the most ancient times, the tearing of the worm has been regarded as a very dangerous accident. It undoubtedly gives rise to violent swelling, fever, and sleeplessness; and if we are to trust the statements of some of the older observers, shortening and deformities of the legs, lingering fistula, mortification, and death (sometimes even sudden death) must be reckoned amongst the probable consequences of breaking the worm.

Although the ordinary seat of this worm is the subcutaneous cellular tissue, it has been found in the tongue, in the layers of the mesentary behind the liver, and under the conjunctiva of the eye. Small *filariæ* of a different species have occasionally been found in the lens of human eye.

GUINEGATE, BATTLE OF, or more familiarly, the *battle of the spurs*, was fought at Guinegate, not far from Tournai, in the province of Hainault, Belgium, Aug. 16, 1513, between the English, under Henry VIII., assisted by a considerable body of troops headed by the emperor Maximilian, and the French, under the Duc de Longueville. The latter were defeated. The battle received its familiar designation from the circumstance of the French knights, having made better use of their *spurs* than their *swords*.

GUINGAMP, a t. of France, in the department of Côtes-du-Nord, is situated in an extensive plain, on the Trieux, in the midst of pleasing scenery, 20 m. w.n.w. of St. Brieuc. It was formerly the capital of the duchy of Penthièvre, and was surrounded by walls, part of which still remain. The site of the castle of the dukes of Penthièvre is now planted with trees, and serves as a promenade. Guingamp has a college, a thread-factory, and several tanneries. Pop. '76, 7,895.

GUIPU'SCOA, the smallest but the most densely peopled of the Basque Provinces (q.v.).

GUI'SBOROUGH, a market-town of the North Riding of Yorkshire, 5 m. from the mouth of the Tees, and 40 m. n. of York. It is connected with the Stockton and Darlington branch of the North-eastern railway. The town lies at the foot of the Cleveland hills, consists chiefly of one main street of good houses, has several churches, grammar and other schools, almshouses, and market-house. The earliest alum-works in England were established here about the year 1600. There is a trade in wool. Rope-making, brick and tile making, and tanning are carried on. The recent development of the iron-stone mining in the neighborhood has brought a large number of miners and others to reside in and about the town, so that since 1861, the population has greatly increased. A rich monastery once stood here, of which a small part still remains, built in 1119 by Robert de Brus, lord of the town. At the time of the reformation, this was one of the wealthiest and most magnificent monastic institutions in the kingdom. Recent excavations have brought to light many interesting antiquities. Among other objects, the workmen came upon the remains of an oak coffin, containing a skeleton, which was found to measure 6 ft. 8 in. in length. Pop. '71, 5,202.

GUISCARD, ROBERT, Duke of Apulia and Calabria, the sixth in order of seniority of the twelve sons of Tancred de Hauteville, was born in the year 1015. Tancred's estates in Lower Normandy being insufficient to support such a numerous family, his three eldest sons, William, Dagobert, and Humphrey, determined to seek their fortunes in the wars of Italy. By good-fortune, courage, and wiles, William gained possession of Apulia; and Robert, desirous of sharing his brothers' fortunes, followed them to Italy with a small band of adventurers. Here he distinguished himself so highly in various battles, that, after the death of William and Humphrey, he was proclaimed count of Apulia. Guiscard next conquered Calabria, in the possession of which he was confirmed by pope Nicholas II., who, but a short time before, had excommunicated him on account of his many acts of violence. Guiscard, from motives of gratitude, bound himself to pay an annual tribute to the Roman see. The feudal superiority still claimed by the papal see over Naples dates from this period. Guiscard now dispatched his youngest brother Roger, at the head of 300 warriors to conquer Sicily, the possession of which had been promised to him by the pope. Roger, in 1060, took Messina, and in the following year the two brothers defeated the Saracens at Enna. Roger eventually conquered the whole island, and became first count of Sicily. Meanwhile, Robert gradually gained possession of the towns that still remained in the hands of the Saracens, among others, Salerno and Bari, and thus established what was till 1860 the kingdom of Naples. He would have carried his victorious standard in other directions, had he not been excommunicated by Gregory VII., on account of his inroad into Beneventum. Having become involved in the affairs of Greece by the marriage of his daughter Helena with Constantine Ducas, son and heir of Michael VII., he dispatched his son Bohemond to undertake

the conquest of Corfu, while he himself hastened to Durazzo, and before the walls of that city gained a brilliant victory over the Greek emperor, Alexius Comnenus. He now marched through Epirus to Thessalonica, and had nearly reached Constantinople, when he received information that the emperor Henry IV. had made an inroad into Italy. He immediately hastened back, after intrusting the chief command to Bohemond, compelled Henry to retreat, and liberated the pope, who was besieged in the castle of St. Angelo. He then returned to Epirus, defeated the Greeks in several engagements, took possession of some islands in the archipelago, and was on the point of advancing a second time to Constantinople, when he died at Cephalonia, July 17, 1085. His remains were buried at Venusa; his sons Bohemond and Roger inherited his possessions: the former received Tarentum; the latter, Apulia. Guiscard was not only a hero and a conqueror, but a patron of the arts and sciences.—Compare Gaultier d'Arc, *Histoire des Conquêtes des Normands en Italie, en Sicile, et en Grèce* (Paris, 1830).

GUISE, a t. of the department of Aisne, France, situated on the left bank of the Oise, 37 m. n.n.e. from Soissons. It is walled, and otherwise fortified. It is an ancient town, and was of much consequence in the early wars of France. Within the town are the ruins of a castle, from which the famous dukes of Guise (q.v.) derived their title. Guise is now a place of considerable commercial and industrial activity; has linen and cotton manufactures, tanneries, etc., weekly markets, and eight annual fairs. Pop. '76, 6,242.

GUISE, the name of a branch of the ducal family of Lorraine, distinguished in the history of France and Europe during two centuries. It derives its name from the little town of Guise, in the department of Aisne (situated on the Oise). The following are its most remarkable members:

Claude of Lorraine, first duke of Guise, peer of France, grand huntsman, count d'Aumale, marquis of Mayenne and Elbeuf, baron of Joinville, etc., was the fifth son of René II., duke of Lorraine, and was born at the château of Condé, Oct. 20, 1496. He left Lorraine on account of a quarrel with his elder brother, accompanied Francis I. to Italy, and received twenty-two wounds at the battle of Marignan, 1515. Eight years later he drove the Germans from Champagne. In 1542 he fought in Flanders under the duke of Orleans. He was favored by the king for his valor and talent. He married Antoinette of Bourbon, by whom he had twelve children, of whom eight were sons. His daughter Mary was the wife of James V. of Scotland, and mother of Mary, queen of Scots. He is reported to have died of poison, April, 1550.

François of Lorraine, second duke of Guise, son of the preceding, was b. Feb. 17, 1519. As a gen., he acquired European renown. He distinguished himself at Montmedy (1542), Landrecies (1543), St. Dizier (1544), Boulogne (1545), and attracted the attention of France by his defense of Metz, besieged for two months by Charles V., who, after firing 11,000 balls, and losing 30,000 men, was obliged to raise the siege (1553). He added to his reputation at Renti (1554), and in 1556 took command of the expedition against Naples. This expedition failed through treachery; but the duke, having been made lieut.gen. of France, retrieved his reputation by taking Calais, Guines, and Ham, which were in possession of the English, and were considered impregnable. His military successes were ended by the peace of 1559. His niece, Mary Stuart, being the wife of Francis II., he became the highest power in the state, and the head of the Catholic party. The death of the king, and a strong party against him, drove him from the court, but he was soon recalled to take the command against the Huguenots, who had taken several important towns, and were committing great ravages. He retook Rouen, and conquered at Dreux (1562). The maréchal St. Andre was killed, the prince of Condé and the constable taken prisoners. Guise, the greatest of his name, was assassinated before Orleans, Feb. 24, 1563. He had a taste for literature, and his memoirs, written by himself, have much historic interest.

Henri I. of Lorraine, third duke of Guise, was b. Dec. 31, 1550. The death of his father placed him at the head of the Catholic party. Ambition and vengeance both stimulated him to action. At the age of 16 he distinguished himself in fighting against the Turks in Hungary. Three years later he fought with the Huguenots at Jarnac (Mar. 1569) and Moncontour (Oct. 1569), and in the same year forced Coligny to raise the siege of Poictiers. He aspired to the hand of Marguerite of Valois, but, to appease the anger of the king, married Catherine of Clèves, 1570. Disgusted with the favors granted to Protestants at the court, he retired, but returned, and was engaged in the massacre of St. Bartholomew, Aug. 24, 1572, in which he saw the dead body of Coligny thrown from the window into the courtyard at his feet. In 1575, fighting with the Huguenots, he was wounded in the face, whence he received the name of *balafré* (scarred), a designation borne also by his father from a similar circumstance. He formed the famous league—ostensibly for the defense of the church, really to raise himself to the throne of Charlemagne. The king coquetted with both parties. Guise conquered Henri of Navarre, but the king refused him entrance to Paris. The people rose in his favor, and he might have been king, but he negotiated. He was promised all the powers which he demanded, but the king caused him to be massacred in the palace, and is said to have kicked his lifeless body. His brother the cardinal was also killed. Their bodies were burned, and the ashes scattered to the winds, Dec. 23, 1588.

Henri II. of Lorraine, fifth duke of Guise, was b. April 4, 1614. He was des-

tined for the church, and at the age of twelve possessed nine abbeys: at fifteen he was archbishop of Reims, but on the death of his elder brother he quitted a calling he detested, and succeeded to the dukedom. Handsome, chivalric, brave, he was a true specimen of the ancient paladin, and celebrated for his numerous gallantries. Loved by Anne de Gonzague, princess of Mantua, he capriciously abandoned her, joined the party of the comte de Soissons, and married the widow of the comte de Bossut. Having joined the league against Richelieu, he was condemned by the parliament of Paris to capital punishment, but took refuge in Germany. On the death of Louis XIII. he returned to France, disgusted with his wife, whose fortune he had spent, and proposed to marry mademoiselle de Pons, one of the queen's maids of honor. He fought in the campaigns of 1644 and 1645 as a volunteer, and then repaired to Rome to get a divorce, but failed. Hearing of the revolt of Naples against Spain, under Massaniello, he set off for that city, in the true spirit of knight-errantry, to conquer a kingdom with his sword for the bride he still hoped to gain. Passing in a felucca through the Spanish fleet, Guise entered Naples in Dec. 1647, and was received with the utmost enthusiasm; but his gallantries, the envy of the nobles, and jealousy of France, caused him to be betrayed, in April 1648, to the Spaniards, and he was carried a prisoner to Spain. Demanded by Condé, he was set at liberty in 1652, and joined, with Condé, the enemies of the court and of Mazarin at Bordeaux. Two months later he had betrayed his allies, and was at Paris with the king, but misfortune still followed him, and he found that his mistress, for whom he had endured so much, was false, and that with his own esquire. Finding himself an object of ridicule at Paris, he attempted to return to Naples, but failed; returned to Paris, was made grand-chamberlain, there directed the magnificent fêtes of Louis XIV., and died without children in 1664. His *Mémoires* (2 vols., Par. 1669) were really written by his secretary, St. Yon.

Henry II. was succeeded by his nephew Louis Joseph, duke of Guise, Joyeuse, and Angoulême. With the son of the latter, François Joseph, who died in 1675, the direct line of the dukes of Guise of the house of Lorraine became extinct. The family possessions passed to the Condé, as being the nearest of kin amongst French houses. Charles, duke of Mayenne, one of the most zealous leaders of the league, was a member of the house of Guise. He died in 1611. Of the descendants of Henry I., the most notable were Charles, who inherited his father's dignities, and died in Italy, whither he had been banished by Richelieu, in 1640; and Claude, duke of Chevreuse, whose wife was Maria von Rohan-Montbaz, widow of the constable de Luynes (died 1679). Louis de Lorraine, cardinal de Guise (born 1580; died 1621), was a nephew of the fifth duke of Guise. Entering the church against his inclination, he became archbishop of Rheims in 1615. He had five illegitimate children by a mistress of king Henry IV. See Bouillé, *Histoire des Ducs de Guise* (4 vols., Par. 1850).

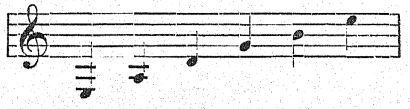
GUISE, Charles de Lorraine, Duc de, 1571–1640; son of Henri and great-grandson of the first duke. He shared in the plots of the league against the duke of Mayenne; afterwards supported Henry IV. and became governor of Provence. After Henry's assassination he went over to the Medici party and was compelled to expatriate himself.

GUISE, Louis de Lorraine, Cardinal de, 1555–88. He was archbishop of Rheims, and in 1578 a cardinal. In the plots of the league he took a leading part whereby he made a bitter enemy of Henry II., by whose order he was assassinated.

GUISE, Louis de Lorraine, Cardinal de, 1580–1621; archbishop, and in 1615 a cardinal. He was more inclined to military than church life, and was sent to the Bastile for some connection with a duel.

GUISE, Louis Joseph de Lorraine, Duc de, 1630–71; succeeded to the dukedom in 1664. He was the husband of a daughter of Gaston, duke of Orleans. He died without issue, and the estate descended to the daughter of Charles, the fourth duke. She too died without children.

GUITA'R, a musical stringed instrument, somewhat like the lute, particularly well adapted for accompanying the human voice, and much esteemed in Spain and Italy. It has six strings, tuned as follows:



and the sound is produced by the fingers of the right hand twitching the strings, while the fingers of the left hand make the notes of the music on the finger-board, which has frets across it like the lyre. The three highest strings of the guitar are always of gut, and the three lowest are of silk spun over with silvered wire. The greatest virtuosi on the guitar were Giuliani, Sor, Zoechi, Stoll, and Horetzky.

GUIZOT Elizabeth Charlotte Pauline de Meulan, 1773–1827; wife of Guizot, the historian, and herself devoted to literature, from an early age. In 1801, she edited a literary journal. In 1807, in consequence of poor health, she accepted the aid of an unknown writer who soon became known to letters, and married her. This was Fran-

çois Pierre Guillamme Guizot, who was 14 years her junior. Her after life was employed in works designed for the intellectual improvement of young persons.

GUIZOT, François Pierre Guillaume, a French statesman and historian, was b. at Nîmes, Oct. 4, 1787. His parents were Protestants; his father, who was an advocate, perished on the scaffold, April 8, 1794, and his mother soon afterwards went, with her two sons, to Geneva, where Guizot received his education. In 1805 he went to Paris, and devoted himself to literature. His first work, the *Nouveau Dictionnaire Universel des Synonymes de la Langue Française* (2 vols.; 4th ed. Paris, 1848), appeared in 1809; the introduction reveals a very methodical mind. The next seven years were spent in laborious literary activity. After the second restoration, he became general secretary to the ministry of the interior, afterwards to the ministry of justice. On the retirement of Barbé-Marbois, Guizot tendered his resignation, and was first appointed *maître des requêtes*, afterwards councilor of state. Guizot contributed to the dissolution of the *Chambre Introuvable*, by writing a memorial which was placed in the hands of Louis XVIII. by Decazes. The latter committed to him the general direction of the administration of the *communes* and *departements* (1819). His writings from 1820 to 1822 are entitled *Du Gouvernement de la France depuis la Restauration et du Ministère Actuel* (1821), *Historie des Origines du Gouvernement Représentatif*, containing his lectures at the Sorbonne (where he held the position of lecturer on history) of 1820–1822 (new ed. 1852). Government forbade his lectures in 1824, and Guizot again betook himself to literature. In conjunction with several other men of letters, he published the important *Collection des Mémories Relatifs à l'Historie de France, depuis la Fondation de la Monarchie jusqu'au 13me Siècle* (31 vols., Paris, 1823–1833); and the *Collection des Mémoires Relatifs à l'Historie de la Révolution d'Angleterre* (26 vols., Paris, 1823). He likewise edited several works of other authors, with introductions, annotations, and additions, such as Letourneur's translation of Shakespeare (12 vols., Paris 1821), Hallam's *History of England*, and Mably's *Observations sur l'Historie de France*, followed by the *Essais sur l'Historie de France*. In addition to all these, he published his *Historie de la Révolution d'Angleterre* (2 vols., Paris, 1826; 4th ed. 1845), and edited the *Encyclopédie Progressive*, and the *Revue Française*. In the following year the Martignac ministry granted him permission to resume his course of lectures on history. These were attended by a large and enthusiastic audience, and gave rise to several historical works of great value, published under the collective title of *Cours d'Historie Moderne* (1828–1830); among others, the *Historie de la Civilisation en France depuis la Chute de l'Empire Romain jusqu'à la Révolution Française* (5 vols., Paris, 1828–1830; 5th ed. 1845), and the *Histoire Générale de la Civilisation en Europe*, etc., which serves as an introduction to the former work. On Mar. 1, 1829, he again took his place in the council of state, and in Jan., 1830, was elected by the town of Lisieux, which he continued to represent in the chamber.

After the July revolution, Guizot became successively minister of public instruction and minister of the interior, an office which he held, with two interruptions, till 1836. In this capacity he did much for the improvement of educational institutions, particularly the primary schools. On the breaking out of the eastern disturbances in the beginning of the year 1840, under Soult's administration, Guizot was sent as ambassador to London. After Soult's retirement, in Sept., 1847, he became the official leader of the cabinet, which maintained its ground, as the organ of Louis Philippe's policy, till the Feb. revolution of 1848, and by its conduct both in home and foreign affairs, did much to bring constitutional government into disrepute, and to hasten the overthrow of the Orleans monarchy. As a statesman, Guizot in carrying out his systematic and repressive line of policy, proved himself stiff, one-sided, and latterly obdurate; from these qualities, as well as from his cold and disagreeable manner, he was always unpopular to the last degree with the nation. As a man of rectitude and austere morals, he never enriched himself at the public cost; but nevertheless, from political motives, he allowed others to do so during his administration, in the most flagrant manner. After having effected his escape from Paris, he retired to London, where he was received with great respect. In April, 1849, he published a circular *Guizot à ses Amis*, in which he offered his services to the electors of France, but ineffectually. In the following Nov. he returned to Paris, where he continued to labor in conjunction with the heads of the monarchial parties. After a short visit to Louis Philippe in England in June 1850, he came forward in Paris as the main promoter of the fusion, and wrote likewise in the *Assemblée Nationale*. The *coup l'état* of Dec. 2, 1851, put an end to this career; and Guizot returned to England. By founding the *Comités Historiques*, by bringing about the publication of important historical documents, and by his own writings and lectures, he did much to extend a taste for historical studies in France. In 1837 he was intrusted by the government of the United States with the task of writing a history of Washington. His work, published under the title *Vie, Correspondance, et Ecrits de Washington* (2 vols., Paris, 1839–40), procured him the honor of having his portrait placed in the chamber of representatives at Washington. After the Feb. revolution Guizot published several political treatises, more or less important, some of which at least are very interesting to Englishmen, such as *Revolution d'Angleterre*, and *Monk, Chute de la Republique*. He likewise wrote *Méditations et Etudes Morales sur la Religion, la Philosophie*, etc. (1852); *Corneille et son Temps* (1852); *Shakespeare et son Temps* (1852). In 1858, appeared his *Mémories pour servir à l'Historie de*

mon Temps. His publication in 1861, defending the temporal power of the pope, was a strange one for a Protestant. Among the most important of his later works are *Méditations sur l'Etat Actuel de la Religion Chrétienne* (1865); *Mélanges Biographiques et Littéraires* (1868); *Mélanges Politiques et Historiques* (1869), etc. Guizot was thrice married; his first two wives were accomplished women, and not unknown in literature. He died Sept. 12, 1874. After his death was published *l'Historie de France depuis les Temps les plus reculés jusqu'en* 1789; *racontée à mes Petits-Enfants*.—His son, MAURICE GUILLAUME, has shown by his *Ménandre Etude Historique sur la Comédie et la Société Grecques* (1855), that he is not destitute of his father's genius.

GUIZOTIA. See RAM-TIL.

GUJERAT. See GUZERAT.

GUJRÁNWÁLA, a British district in the Punjab, India; 2,563 sq.m.; pop. '68, 550,576. It forms the central portion of the Rechna Doáb, intermediate between the fertile submontane plains of Siálkot and the desert expanses of Jhang. On the northern frontier, a belt of alluvial land, from 2 to 6 m. in breadth, fringes the Chenáb throughout its course. The southern portion of the plateau has a rich soil, with accessible water; the villages here lie close together, while the people are industrious cultivators. But further s. the ground becomes harder and drier until in the extreme s. the *bar*, a flat expanse of barren land, passes slowly into the desert of Jhang. In the s.e. corner of the district the little river Degh irrigates and fertilizes a tiny valley of its own. Two or three minor watercourses are used for the purpose of irrigation in the villages through which they pass. The country is bare of trees, and the scenery throughout is tame and in the central plateau becomes very monotonous.

GULDEN. See FLORIN.

GULES (Fr. *gueules*, the mouth and throat, hence red. Other origins are given, such as the Persian *ghul*, a rose or rose color, which seems more probable than the Hebrew *gulude*, a piece of red cloth, from which Mackenzie derives it; it being scarcely likely that it came from a Semitic source), the term by which the color red is known in heraldry. In engraving it is marked by perpendicular lines traced from the top of the shield to the bottom. See HERALDRY. It is supposed to indicate valor, magnanimity, and the like, and is regarded as the most honorable heraldic color.

GULF STREAM AND OCEAN-CURRENTS. The most important and best known of the great ocean-currents derives its name from the gulf of Mexico, out of which it flows, between the coast of Florida on the one side, and the Cuba and the Bahama Islands and shoals on the other. With a breadth of about 50 m. in its narrowest portion, it has a velocity at times of 5 m. an hour, pouring along like an immense torrent. This great ocean-river flows in a north-easterly direction along the American coast, gradually widening its current and diminishing in velocity, until it reaches the island and banks of Newfoundland, when it sweeps across the Atlantic, and divides into two portions, one of which turns eastward towards the Azores and coast of Morocco, while the other laves the shores of the British islands and Norway, and can be perceived on the southern borders of Iceland and Spitzbergen, nearly as far e. as Nova Zembla.

The waters of the gulf stream are of a deep indigo blue, with boundaries sharply defined against the light green of the seas through which it passes in its early course. It abounds with masses of sea-weed, torn from the coral rocks of the strait through which it passes when it has its greatest power and velocity; while in its warm current may be seen myriads of fish and of animalculæ. As this great stream pours out of the gulf of Mexico, it has a warmth of 84° in summer, being 4° higher than that of the ocean at the equator. In mid-Atlantic, opposite Nova Scotia, it has fallen at all seasons only about 14°; while the British islands and north-western coasts of Europe, at a distance of 4,000 m. from the gulf, are bathed with waters heated under a tropical sun, and have their temperatures raised in winter about 30° above the normal temperature of the latitudes. In mid-winter, off the inclement coasts of America, between cape Hatteras and Newfoundland, ships beaten back from their harbors by fierce north-westers, until loaded down with ice and in danger of foundering, turn their prows to the e. and seek relief and comfort in the gulf stream. A bank of fog rising like a wall, caused by the condensation of warm vapors meeting a colder atmosphere, marks the edge of the stream. The water suddenly changes from green to blue, the climate from winter to summer; and this change is so sudden, that when a ship is crossing the line, a difference of 30° of temperature has been marked between the bow and the stern.

The great differences of temperature between the western shores of Europe and the eastern shores of America have been attributed, too largely, perhaps, to the influence of the gulf stream. There is no doubt that such an immense body of heated water in the north-eastern Atlantic must raise the temperature of the atmosphere, and that to this importation of the effects of tropical sunshine by sea is due, to a certain extent, Ireland's perpetual green, the soft, moist climate of England and Scotland, and the fact that the harbors of the western and northern coasts of Norway, as far e. as Varanger Fjord, remain open, when the Baltic, much further s., is a sheet of ice. England, clothed

in perennial verdure, and Scotland, where the grass grows during 11 months of the year, are in the same latitude as the frozen and horrible coast of Labrador. Norway is opposite Greenland; and Lisbon, where frost is scarcely known, is in the same latitude as Washington, where the Potomac river, a mile in breadth, sometimes freezes over in a single night. This difference is to be ascribed, not to the gulf stream alone, but to that in conjunction with the prevailing south-westerly winds. The Mediterranean, exposed to no cold currents from the arctic regions, bearing bergs and fields of ice, is a constant receiver and distributer of heat, and modifies the temperature of adjacent regions. North America, on the contrary, is exposed along its eastern shore to a great current from the polar seas, running inside and counter to the gulf stream, and coming loaded with ice from the northern regions; and while the continent narrows towards the tropics, it grows broad in the polar regions, from which come the cold north-westers, the prevailing winds during the wintry season.

The effect of the gulf stream upon temperature has been nowhere more strikingly observed than in high northern latitudes. Where the warm stream from the s.w. meets the arctic current in the latitude of Iceland, a difference of 17° has been observed.

In treating of the cause or causes of the gulf stream, we must take a general view of ocean-currents. Taken altogether, they form a connected system which has been aptly compared to the circulation of the blood. The two prime movers are differences of temperature and prevalent winds. Sea-water of average saltness does not freeze until it is cooled down to about 28°; and, unlike fresh water, it continues to grow heavier down to that point. The effect of the intense cold of the polar regions is thus to cause a constant sinking down of the surface-water, and to establish a current of ice-cold water along the bottom towards the equator; while to supply the place of what sinks down, an indraught or northward flow takes place on the surface, which brings the warm water of the temperate and tropical regions toward the poles. This is the general theory of the *vertical* circulation of the ocean—a circulation which might almost be assumed from the well-known laws of the flow of liquids, and which recent observations have established as a fact. The general prevalence of cold currents along the bed of the ocean from the poles to the equator is now beyond dispute. The soundings taken recently by H.M.S. *Challenger* show the temperature of the bottom water between Sombrero in the West Indies and Teneriffe to vary from 34°.4 to 35°.5; while at the equator it is in some places still lower, being only 32°.4. This is held to prove that the Antarctic bottom current extends to the equator and beyond it. Motion once thus begun, however, is differently modified in each locality by the shape of the coasts, by prevalent winds, and other circumstances. But one cause which modifies all currents that tend either n. or s., is the daily rotation of the earth. In the very same way that the rotation of the earth gives the trade-winds their peculiar directions (see WINDS), it causes the cold currents coming from the poles to turn towards the s.w., and the surface-currents from the s. to take a n.e. direction. At the equator, any spot on the surface is moving eastward at the rate of 1000 m. an hour; at 60° n. latitude, the velocity is only one half. Thus, the water of a current starting from the equator northward, is constantly coming to places where the bottom under it has less and less eastward velocity. But, by the law of inertia, the water tends to retain the same velocity eastward with which it started, and thus it moves to the e. of n.—shooting ahead, as it were, of the bottom over which it is flowing, as a rider does whose horse slackens his pace. The contrary happens to a stream flowing from n. to south. In this case, the eastward motion or motal inertia of the water is too slow for the parts of the bottom to which it successively comes; the bottom slips in a manner from under it, and it falls to w. of south. This, in combination with the action of opposing coasts, accounts for the circular sweep which many of the currents make, returning partly into themselves.

Different in origin from this vertical circulation, though partly mixed up with it, is the *horizontal* circulation caused by prevalent winds. The best example of this is the equatorial current, which sets from the w. coast of Africa to the e. coast of Brazil, and which is owing to the action of the trade-winds. Currents caused by winds are called "drift-currents," in opposition to the deeper-seated "stream-currents." In order to feed this westerly equatorial current, there spring up two *in-draught* currents, which also follow the prevailing winds of their respective regions—the one from the n. along the w. coast of Portugal and Morocco, the other from the cape of Good Hope along the w. coast of Africa, as far as the gulf of Guinea. When the equatorial current reaches the coast of Brazil, it divides into two branches. One proceeds southwards, turning gradually eastwards across the Atlantic until it falls in with the northern in-draught from the cape of Good Hope. The other branch is deflected northwards into the Caribbean sea and the gulf of Mexico. The water thus driven into this pent-up sea now rushes with accumulated momentum through the strait or gulf between Florida and the Bahamas, and forms the famous gulf stream.

It has usually been held that the gulf stream extends across the Atlantic to the shores of northern Europe, and is the cause of the mild and moist climate enjoyed by the western parts of that continent. The opinion, however, is beginning to prevail that, as a distinct current, the gulf stream ceases in the middle of the n. Atlantic, its waters being by this time thinned out to a mere film, and its initial velocity and distinctive heat having been dissipated. That warm waters from tropical seas are brought

to the coasts of Britain, and even into the polar seas beyond, is proved by drift-wood, seeds, and fruits from the West Indies being frequently cast ashore on the Hebrides, the n. of Norway, and Spitzbergen. But this is accounted for by the general flow of the surface-water towards the poles, forming part of the vertical oceanic circulation, a flow which receives an eastward deflection as it proceeds northwards, in the way above explained. This general set of the surface-water is further promoted by the prevalence of south-westerly winds, which maintain a pretty constant n.e. *drift* over the whole surface of the north-eastern portion of the Atlantic. In this way, although the gulf stream may have lost its original impetus, a large portion of the super-heated water which it brings into the center of the Atlantic is carried to the shores of Europe and into the Arctic sea.

The Pacific ocean has also its great equatorial or trade-wind current, but there is no great basin like the gulf of Mexico to gather the waters of another gulf stream. A portion of the equatorial current passes northward along the shores of China and Japan; a portion passes through the narrow channels of the Indian seas, and another portion turns southward towards Australia and New Zealand, affecting, doubtless, the isothermal lines in those latitudes, and returning in counter-currents to cape Horn, and even passing around it into the Atlantic. While thus a portion of the great counter or polar current of the south Pacific sweeps around cape Horn, another portion passes up the western coast of South America across the equator to 5° n. lat.; and its coolness is sensibly felt, and was carefully observed by baron Humboldt on the coast of Peru. The currents in the waters between the Pacific and Indian oceans are also variously affected by the monsoons, and in some places run six months in one direction, and six months in the opposite, clearly proving that they are mainly dependent upon the direction and force of the winds. A chart of ocean currents was published by the admiralty in 1872 which proves beyond a doubt that it is almost wholly to the prevailing winds we must look for an explanation of ocean currents.

At first sight it appears incredible that a current of water should force its way through the ocean with sharply defined boundaries, and a peculiar color, temperature, and inhabitants, like a great river flowing between its banks, for thousands of miles and against the force of counter-currents, which even cross its course, passing under by their superior density, until it loses its momentum on the shores of distant continents, or spreads out its warm flood on the bosom of northern seas. But a closer observation will satisfy us that all this is in accordance with the laws of hydrodynamics. At the confluence of the clear waters of the Mississippi with the turbid current of the Missouri, the two rivers do not at once unite, but run side by side with a sharply defined boundary between them for many a league. So great rivers running into the ocean, are rivers still, far out at sea. The current of the Rio de la Plata, which drains the southern portion of South America, can be perceived 200 m. from land; and the Amazon sweeps far into the Atlantic, though gradually bent northwardly by the great trade-wind current, and then carried along the coast, to help, with the Orinoco, to swell the waters of the gulf of Mexico; so that the waters of the Amazon, the Orinoco, the Rio Grande, and the Mississippi, all join to swell the gulf stream.

The channel of the gulf stream in its narrower portion is of great depth. From observations made by the *Challenger* in 1873, in that part of the stream between Bermuda and New York, it is seen the gulf stream is there about 100 fathoms deep, and 80 m. in width. The probability of its having hollowed out for itself a well-defined channel like the bed of a river, is shown by a sudden increase of depth at its border, where deep-sea soundings have been made; but so little can be known of the effect of currents upon a line of 20,000 ft. in length, and which require several hours to run off the reel, that we cannot place implicit reliance on such observations.

More important observations on the courses and influence of these currents have been lately undertaken by dropping bottles containing the date, latitude, and longitude, in all parts of the ocean. These bottles, when found upon the coast thousands of miles distant, give some indication of the direction and velocity of the currents that have brought them; but such testimony is not infallible. The bottle may be impeded by contrary winds, blown into counter-currents, or whirled about for months in eddies. A bottle thrown overboard in the Indian ocean might reach the island of Spitzbergen, *viâ* the gulf of Mexico; but there are many chances that it would be thrown out of the regular current, and be picked up on the shores of New Zealand or the coast of Peru. See Dr. Franklin's *Maritime Observations*, Pownall's *Hydraulic and Nautical Observations*, Humboldt's *Atlas Geographique et Physique*, Johnston's *Physical Atlas*, Maury's *Physical Geography of the Seas, and Wind and Current Charts*, and admiralty wind and current charts for Pacific, Atlantic, and Indian oceans.

GULFWEED (*sargassum*), a genus of sea-weeds (*algæ*) of the sub-order *fucaceæ*, of which two species (*S. vulgare* and *S. bacciferum*) are found floating in immense quantities in some parts of the Atlantic, Pacific, and Indian oceans. They are tropical plants, although sometimes carried by winds and currents to the British coasts. The frond is very long, and is furnished with distinct, stalked, nerved leaves, and simple axillary stalked air-vessels. The receptacles are linear, in small axillary clusters or racemes. The trivial name *bacciferum* applied to one of the species, is derived from the berry-

like appearance of the air-vessels. The gulfweed has only been found floating, but there is reason to think that it is at first attached to the bottom of comparatively shallow parts of the sea. It floats in large fields, or more frequently in long yellow lines in the direction of the wind. In crossing the Atlantic, its presence is regarded as a sure indication of the gulf stream, by which it is wafted northward and eastward. Where the gulf stream is deflected from the banks of Newfoundland eastward, and sends off its more southern branch towards the Azores, is situated the *Sargassa sea*, "that great bank of weeds, which so vividly occupied the imagination of Christopher Columbus, and which Oviedo calls the sea-weed meadows" (*Humboldt*). The quantity of floating sea-weed is often such as to impede the progress of ships. Multitudes of small marine animals accompany it, with fishes ready to prey on them. The gulfweed is eaten in China; and in other parts of the east also, it is used in salads and as a pickle.

GULIEL'MA, a genus of South American palms, with pinnate leaves (entire in young plants), natives of the lower mountain-ranges of Peru and New Granada. One species, Gulielma *speciosa*, is much planted by the Indians of the Amazon district and of Guiana, and Venezuela, near their villages, and supplies them with food and other necessaries. It is often 60 ft. high, having an erect slender stem, encircled with many rings of needle-like spines, and numerous drooping leaves forming a nearly spherical crown. It is variously called *papunha paripou*, etc; and sometimes *peach palm*.

GULL, *Larus*, a genus of web-footed birds, of the family *laridæ* (q. v.), inhabitants of the sea-coasts of all parts of the world. The feet have three toes in front completely united by a web, and a small hind-toe not included in the web, and sometimes altogether wanting. The wings are long and pointed. Gulls have great power of wing, and fly apparently with ease against a storm, during the continuance of which they generally fly low, whether over sea or land, but in fine weather soar higher in the air, in which they seem to delight in performing the most varied and beautiful evolutions. They descend with great rapidity to seize prey from the surface of the water or at a small depth; but they are not good divers, and the fishes which they catch are chiefly those which, like the herring and others of the same family, swim near the surface. They are very voracious. Their food consists of almost anything animal. Many of them are wholly or partially migratory, breeding in colder regions than those which they inhabit in winter. In general, they lay only two or three eggs, which are large for the size of the bird.

Many of the gulls are frequent visitors of inland districts, ascending rivers, and hovering over them in quest of prey as over the sea. Some of them are also often to be seen in meadows and plowed fields, seeking for worms and other such food. It is a common notion in Britain that the appearance of gulls in inland districts betokens stormy weather. But in America, the migrations of some of the species between the northern seas and the gulf of Mexico are performed, not only along the Atlantic coast, but by the great lakes and the valleys of the Ohio and the Mississippi, and a few occasionally remain and breed near these inland waters. Large flocks of a species of gull (*L. serranus*) frequent the lakes of the high table-lands of Peru.

Some at least of the larger gulls break the shells of mollusks by taking them up to a sufficient height in the air, and dropping them on a rock. This interesting fact is attested by Audubon, the American ornithologist, as having come under his own observation, and he mentions an instance in which a gull, finding the shell not broken by the fall, carried it up a second and a third time, and each time higher than the former.

The flesh of gulls is rather coarse, but that of the young is in request on many northern coasts as an article of food, and is salted for winter use. The eggs of certain species, such as the black-headed gull, are said to be very palatable, and are collected in great quantities in some places where these birds breed in large numbers.

The plumage of gulls is generally in great part white, variously mixed with gray, slate-color, brown, and black. The white, in some species, assumes a rosy tint in the breeding season; and the head of some becomes black. The differences of plumage, according to age and season and sex, are very considerable, and have led to many errors as to species.

One of the most common British species is the BLACK-HEADED GULL (*L. ridibundus*), the whole length of which is about 16 in.; another is the COMMON GULL or SEA MEW (*L. canus*), mostly of a gray color above, and white below, fully 18 in. long; the HERRING GULL (*L. argentatus*), a still larger species, is common on rocky coasts; the KITTIWAKE (*L. tridactylus* or *L. rissa*), rather smaller than the first-named species, gray and white, destitute of hind-toe, is plentiful where the coast is girt with rocky precipices, on the narrow ledges of which it makes its nest; its young and eggs are among the chief objects of pursuit of the rock-fowlers; the LESSER BLACK-BACKED GULL (*L. fuscus*), about 23 in. long, is pretty common, at least in the n.; the GREAT BLACK-BACKED GULL or WAGEL (*L. marinus*), nearly 30 in. long, is not rare; and the GLAUCOUS GULL or BURGOMASTER (*L. glaucus*), scarcely inferior to it in size, though by some supposed to be identical with the great black-backed species, of a pale bluish-gray color above, and white below, is a winter visitant from the arctic regions. This species seems to have acquired its name of burgomaster from the superiority which, in virtue of its size and strength, it asserts over most of the smaller birds of the northern seas, compelling them

to relinquish prey at its approach. Some of the British species of gull are also common in North America, as the HERRING GULL and the GREAT BLACK-BACKED GULL and the KITTIWAKE; but the COMMON AMERICAN GULL (*L. zonorhynchus*) is not found on the eastern shores of the Atlantic.

GULL, Sir WILLIAM WITHY, b. England 1816; graduated in medicine at London university; professor of physiology at the royal institution, and fellow of the royal college of physicians. He was for twenty years physician to Guy's hospital. In 1872 he was made a baronet. He is president of the clinical society, member of many other associations, and the author of several works on medical subjects.

GULLET. See ESOPHAGUS.

GULUN'CHA, *cocculus cordifolius,* a plant of the same genus which yields calumba (q.v.), extensively used in the East Indies as a tonic and febrifuge. It is largely cultivated in some parts. It is a climber, with heart-shaped leaves. It exhibits a wonderful tenacity of life. When it has acquired the diameter of half an inch, it is not unusual to cut from the main stem a portion of from 20 to 30 ft. in length, when the part sustained by the branches of the tree sends down threads to the ground, which take root, and become new stems. To plant it, a few yards of the stem are merely made into a coil, and hung on the branch of a tree (Tennent's *Ceylon*).

GUM, a general term applied to certain exudations from trees and plants, which are very different in their chemical characters and their general properties. In its strictest sense, gum is a substance which dissolves in water, forming a transparent mucilage; it is insoluble in ether, alcohol, and oils, either fixed or volatile, and is convertible into oxalic acid by the action of sulphuric acid. The gums belonging to this class are:

1. *Gum arabic,* which is gathered from the stems of *acacia arabica* or *acacia vera,* two leguminous trees found in northern Africa, and in some parts of Asia. It varies in color from a light straw to a garnet red, and is more or less transparent: the lightest is always the best. It is imported from Barbary and Turkey.
2. *Barbary gum,* a dark-colored variety, also imported from the Morocco coast. It has some qualities which render it particularly valuable to confectioners, in the manufacture of lozenges, etc. It is the produce of another species of acacia, *A. gummifera.*
3. *Gum gedda,* an inferior quality of Barbary gum.
4. *Gum senegal* is in fine large, round tears, generally larger than the finest gum arabic; it is, however, darker in color, being a sherry brown, with sometimes a slight pinkish tint perceptible on the surface of the drops or tears. It is found generally in the tropical parts of the western coast of Africa, and is yielded by two species of acacia, viz., *A. senegal* and *A. seyal.* It is much valued for dressing various textile fabrics, such as muslins and silks, and is also used by confectioners for the finest kinds of lozenges, etc. The *acacia arabica* is also found in the East Indies, and is supposed to yield, with other species, the following gums known in commerce.
5. *Gum gattie,* which is imported very largely, and is produced in the Deccan, Concan, and in Guzerât.
6. *Gum babool,* an inferior gum, imported from Bengal.
7. *East Indian gum,* a tolerably good variety, imported from Bombay.
8. *Gum oomrawuttee,* an inferior variety, from the province of Oomrawuttee.

These East Indian gums are all dark colored, and are much inferior to those produced in Africa; they are, however, extensively imported into the ports of London and Liverpool; over 200 tons are annually received into those ports.

The gums above described principally consist of a material which chemists have called *arabin,* from its being the chief constituent of gum arabic. We now come to another class of gums, in which another material, called *bassorin,* from its being first noticed in an analysis of *gum bassora,* is more or less present. These are:

1. *Gum tragacanth,* or dragon, yielded by the leguminous shrub *astragalus tragacantha;* it was known to the ancient Greeks under the name of *tragakantha.* The finest pieces are in flakes, from an inch to an inch and a half in length, and from half an inch to an inch in width. This gum is more or less white, and nearly opaque, that which is whitest and most opaque being the best. It is only partly soluble in water, forming a white paste, instead of a transparent solution; with vinegar or dilute acetic acid it also forms a similar paste, and is a valuable cement, holding light materials with great tenacity. It is used as a stiffening material for various textile fabrics, and is much valued for this purpose, where it is not desired to give gloss to the material. We receive it chiefly from Smyrna and Constantinople. It is mostly produced in northern Persia and Asia Minor.
2. *Gum kuteera,* yielded by *sterculia urens* on the Coromandel coast. It is now only an occasional import, though formerly a considerable quantity was brought to this country.
3. *Gum bassora.*—This is imported from Bassora; hence its name; but although long known in commerce, it has not been satisfactorily determined what plant produces it. Only a very small quantity reaches this country from time to time.
4. *African or Sierra Leone tragacanth.*—This is occasionally imported in small quantities from western Africa, and is produced by *sterculia tragacantha.*

Besides the true gums, there are the

GUM-RESINS, which are much more mixed in their chemical constituents; in general terms, however, they may be said to consist of certain resins soluble in alcohol, and of the true gum, so that it requires both water and alcohol to dissolve them entirely. They are chiefly used in medicine and perfumery, and may be said to form a connecting link between the true gums and the true resins, commercially speaking. The principal are:

1. *Gum asafœtida.* See ASAFŒTIDA. 2. *Gum benzoin* or *benjamin.* See BENZOIN. 3. *Gum styrax* or *storax* is another sweet-scented gum-resin, produced by *styrax officinalis* in Turkey in Asia. It is usually liquid, of the consistence of treacle, and a blackish or dark-gray color. It is also used in perfumery. 4. *Gum sagapenum*, another medicinal gum with unpleasant garlic-like odor, dark-brown color, and a soft consistency. It is not known what plant produces it, but it is generally supposed to be obtained from a *ferula.* 5. *Gum galbanum.* See GALBANUM. 6. *Gum opopanax* is yielded by the roots of another umbelliferous plant, *opopanax chironium.* It comes from the Levant in reddish-yellow lumps of a disagreeable smell. Its only use is in medicine, chiefly for plasters. 7. *Gum ammoniacum.* See AMMONIACUM. 8. *Gum myrrh* is a very sweet-smelling gum resin, which exudes from the stems of an Abyssinian shrub, the *balsamodendron myrrha.* Two distinct kinds are known in commerce, the Turkish and the East Indian; the former is the better. They are both in irregular-shaped small lumps, rarely exceeding the size of a walnut, of a reddish-brown color, rather lighter in the Turkish sort. Considerable quantities are used in medicine, and in perfumery for dentrifices, washes for the teeth, etc., in consequence of its being supposed to possess considerable antiseptic properties, and for the agreeable odor it imparts to the breath. From 15 to 20 tons are imported annually. 9. *Gum scammony.*—This is obtained from incisions made purposely in the crown of the great tap-root of the *convolvulus scammonia,* which is bored for the purpose. It is of a dark sap-green color, inclining to greenish-gray, in large and small cakes, and in irregular fragments. Its use is extensive as a mild and safe purgative for children, but scarcely any drug has been so uncertain in its operation, owing to the excessive adulteration practiced upon it by the Turks previous to its shipment. This has now been obviated by importing the root itself, and extracting the gum in this country.

There are many other gums known, but these are the ones to be had in shops, and for which uses are found in the arts, manufactures, and in medicine. Many also of the true resins, as copal animi, etc., are called gums, but they are strictly *resins.* See RESINS.

Gum-substitutes are manufactured from wheat-starch, farina or potato-starch, sago-flour, and other feculas, by baking or roasting, so as to convert the starch into dextrine (q.v.). This is now an important manufacture, in which a large amount of capital is engaged. They are made on a very extensive scale by the Messrs. Laing of Manchester and others, and are largely employed in dressing calicoes and other fabrics, also as a substitute for the more expensive gums in gumming paper, as in the case of postage and receipt stamps, which are made adhesive by dextrine. For this and some other purposes, the *gum* substitutes are superior to the real gums, as they are easily dissolved, and can be spread more equally over a smooth surface. Very large quantities of the starch of potatoes, called farina or potato-flour, are made in this country, and are also imported from the continent to be used in this manufacture.

GUMBIN'NEN, a thriving t. of Prussia, in the province of Prussia, is situated on both banks of the Pissa, one of the affluents of the Pregel, 68 m. e.s.e. of Königsberg. It was first regularly laid out in 1724, and owes its rise and prosperity in great measure to the settlement here of many Protestants, chiefly from Salzburg, who were driven from their homes by religious persecution. Among other institutions, the town has a gymnasium, a public library, three Protestant churches, and two hospitals. Woolen-cloth weaving, brewing, and distilling, are the branches of manufacture. Pop. '75, 9,116.

GUMBO, a kind of soup, prepared from okra, and much in vogue in the southern states. It is made in various ways, sometimes containing considerable animal flesh, the most favorite being chicken. Gumbo soup proper, however, is composed principally of okra with portions of other vegetables added according to the taste, as rice or pearl-barley. The name is thought by some to have originated with the slaves, but that is doubtful. See OKRA.

GUM-BOIL, an abscess (q.v.) near the root of a tooth, and discharging itself towards the mucous membrane of the gum; usually superficial, but sometimes more deeply seated in connection with the bone, and causing considerable deformity, with risk of caries (q.v.) or necrosis (q.v.). Gum-boil should be treated, in the first instance, by simple protection against cold and external injury; but as soon as the presence of matter can be ascertained, it is usually good practice to give vent to it by a pretty free incision.

GUM TREE. See EUCALYPTUS and TUPELO.

GUM'MEL, a t. of Africa, in the state of Bornu, in lat. 12° 38′ n., and long. 9° 21′ east. In 1851, on the occasion of Dr. Barth's first visit to Gummel, he found it a flourishing town, the great entrepôt for the natron trade, with a weekly market, at which were 300 stalls, offering for sale all sorts of clothing, tools, pottery, victuals, cattle, horses, etc., and with a population of 10,000; but in 1854, on visiting it on his return journey, he found that, during the interval, it had suffered severely from civil wars, and was then in a state of at least temporary decay.

GUMMING, a disease analogous to *canker* (q.v.), and like it, very destructive to fruit-trees, but confined to those the sap of which readily produces much gum; as the cherry, plum, peach, apricot, and almond. It is supposed sometimes to originate in wounds, in which a morbid exudation of gum takes place; but it appears to be more frequently occasioned by severe frosts, and to be very much dependent upon causes which induce a general unhealthiness. It very generally terminates in the destruction, not merely of the branch in which it originated, but of the whole tree, although trees in which it is in sure progress sometimes live for years, and meanwhile produce large crops of fruit. A small fungus (*næmaspora crocea*), which has been supposed to be the cause of gumming, more probably appears in consequence of it.

GUMRI, an old t. of Russian Armenia, on the site of which the important city and fortress of Alexandrapol—pop. '67, 17,272—have been built. The site is on the high-road to Erivan, and is 60 m. n.w. of that town. Alexandrapol is built at an elevation of 5,860 ft. above sea-level, and here the cold is so intense that men are often frozen to death in the fields.

GUM'TI, a river of India, remarkable, as its name is meant to express, for its windings, rises in a small lake in lat. 28° 35′ n., and long. 80° 10′ e., and after a south-eastern course of 482 m., enters the Ganges from the left in lat. 25° 29′ n., and long. 83° 15′ east. It is navigable for inland craft as far up as Lucknow, which is fully more than 300 m. above its confluence with the Ganges. At Jaunpore, about 56 m. from the Ganges, it is spanned by a bridge of 16 arches.

GUN, a term applied in its most general application to firearms of any description, but in the more restricted and technical sense to cannon (q.v.). A gun is a frustum of a right cone, with a cylinder excavated round the axis, to serve as a bore. Close home to the end of this cylinder, the powder is driven, and outside it is the ball to be expelled.

The trunnions are cast in one mass with the piece, and are placed in the second reinforce in such a position that the breech-end of the gun outweighs the muzzle. Their axis is generally about half their diameter below the axis of the piece. This locality has several conveniences; but for the maximum of steadiness in the recoil, it has been shown that the axes of the trunnions and of the gun should exactly intersect. The use of the trunnions is to suspend the cannon on its carriage in such a manner that it may be readily depressed or elevated, but so that it shall have no horizontal motion which is not shared by the whole carriage.

The vent or touch-hole, the channel through which the charge is fired, is a small cylindrical orifice leading at an angle from the breech of the bore towards the base ring. The explosion within reacts with great force on the lower portion of the vent, and in case of rapid or long-continued firing, soon honeycombs the iron or brass, often dislodging considerable fragments. This, besides diminishing the regularity of the action of the powder on the projectile, would involve danger of bursting if permitted to any great extent. The gun so affected is therefore *bouched*, that is, has a new vent constructed. The process consists of drilling a female screw, of larger than the required diameter, in the metal of the gun. Into this matrix, a bar of pure copper is screwed (copper being the metal least liable to fuse under the intense heat of ignited gunpowder), and the vent is then drilled through the copper. Sir A. Dickson devised the following simple mode: he rammed a cartridge of sand firmly into the breech, then filled the vent and all the interstices with molten copper, and had only to bore a hole through the latter to complete the operation. In cases of great urgency, even this simple procedure may be shortened by the insertion of the stem of a tobacco-pipe during the filling; the pipe, when removed, leaves a perfect vent.

With reference to rifled cannon, some particulars have already been given under ARMSTRONG GUN, and fuller details will be given under RIFLED ARMS. Under the heading CANNON will be found some details as to various kinds of heavy guns, as well as under the several headings LANCASTER GUN, MORTAR, SHELL-GUN, etc. The history of guns and gunpowder is sketched in the article FIREARMS. For the ordnance now in use in the British army and navy, see WAR SERVICES. The various kinds of small-arms are discussed under their respective heads, as ARQUEBUS, MATCH-LOCK, PISTOL, REVOLVER, RIFLED ARMS.

GUN-BOAT, a small boat or vessel armed with one or more guns of heavy caliber. From its small dimensions, it is capable of running close inshore or up rivers, and from the same cause it has little chance of being hit by a larger vessel at the long range which the carrying power of its guns enables it to maintain. On the outbreak of the Russian

war (1854–56), as the British navy was without a single gun-boat, a large squadron of them was hastily constructed in 1855 and 1856, but too late for that special war. From the haste with which they were put together, most of those vessels proved defective. Their tonnage was small; and their armament usually consisted of one 8-inch gun and one 100-pounder Armstrong gun. In the last two wars with China, gun-boats performed excellent service, having penetrated nearly to Peking, and far up the Yang-tze-kiang. Gun-boats in their more modern form are small mastless vessels mounting one large gun in the bow, and propelled by an engine with single or twin screws. The gun is pointed by means of the helm or the screws, and the gun-boat is in fact a floating gun-carriage. The *Staunch*, the first gun-boat built on this principle for our navy, has given her name to the whole class. In our navy these gun-boats carry an armor-piercing gun of 18 tons, on a draught of only 4 feet. But they have been designed to carry even 35-ton guns. Four have lately been built by Messrs. Armstrong for the Chinese navy —the *Alpha, Beta, Gamma, and Delta;* two of these carry a 25-ton gun, and two a gun of over 30 tons. A small flotilla of such gun-boats, protected only by their small size, would be in coast defense formidable opponents even for ironclads. At the beginning of the century the United States had over 250 of these vessels; but the "gun-boat system" was soon abandoned. Some of the continental navies are well provided with gun-boats.

GUN-CARRIAGE is a very important element in the equipment of each piece of ordnance. It requires to be of great strength, and at the same time of considerable weight, in order that the whole apparatus—gun and carriage together—may not be driven backward by the recoil in firing. Field-gun carriages have, besides, to bear an enormous strain in passing at a rapid pace over broken, uneven, or rocky ground. To provide for this severe wear and tear, every part is fitted with the utmost precision, made of well-seasoned material, and on strict mechanical principles. A large department, fitted with splendid machinery, in the royal arsenal at Woolwich, called the royal carriage department, is charged with this branch of manufacture for the British service. Carriages are of various kinds, according to the service for which they may be required. When a field-gun is to be moved, the trail-plate is hooked to the limber (q.v.), which converts the gun-carriage and limber into a 4-wheeled vehicle, capable of conveying the gun, its tools and ammunition, and several of its gunners. Information relative to certain species of gun-carriages will likewise be found under TRAVERSING PLATFORM. Among modern inventions of war is the Moncrieff or elevating gun-carriage, in which the gun is poised at the end of a lever pivoted on the carriage, and balanced by a heavy counter weight. Before firing, the gun is raised by mechanism; when fired, its own recoil drives it down upon the carriage. This arrangement enables gun and gunners to lie concealed behind a parapet until the moment of discharge.

GUN-COTTON, a detonating substance, invented by Schönbein in 1846, and obtained in the following manner: One part of finely-carded cotton is immersed in 15 parts of a mixture of equal measures of strong nitric acid (sp. gr. 1.5) and sulphuric acid (sp. gr. 1.845). The cotton must be completely immersed in the mixture, otherwise it becomes so hot as to undergo immediate decomposition. After a few minutes' immersion, it must be plunged into a large volume of cold water, and then washed till the moist mass ceases to show any acid reaction when placed on litmus paper. It is then to be carefully dried at a temperature not exceeding 170°.

Any substance containing cellulose, such as tow, linen, saw-dust, paper, etc., may be employed instead of cotton, and the change that takes place in the formation of the explosive compound seems, from the researches of Hadow, to be as follows: the composition of cellulose is represented by the formula $C_{36}H_{30}O_{30}$. In the formation of gun-cotton or *pyroxylin* (derived from *pyr*, fire, and *xylon*, wood), nine equivalents of the hydrogen are replaced by an equal number of equivalents of peroxide of nitrogen (NO_4), so that the formula for the new compound is $C_{36}H_{21}9NO_4,O_{30}$. The fiber, in undergoing this change, increases about 70 per cent in weight, and acquires perfectly new properties. Although scarcely differing in appearance from unchanged cotton, it may be distinguished from it by its harshness, by the crepitating sound which it yields when pressed by the hand, by its having lost the property of depolarization which ordinary cotton possesses, and by its electric condition. Iodine dissolved in a solution of iodide of potassium affords a certain means of distinguishing explosive from ordinary cotton. If the former is moistened with this iodine solution, and a little dilute suphuric acid is subsequently added (one part of the acid to four of water), a yellow color is evolved; while ordinary cotton wool, when similarly treated, assumes a blue color. Its most remarkable property is, however, the facility with which it takes fire, and its rapid and complete combustion. The results of gen. von Lenk's improvements in the manufacture of gun-cotton, which, however, did not lead to its superseding gunpowder in any one direction, are given below. The more recent experiments of prof. Abel, which were carried on with elaborate care for a number of years at the Woolwich arsenal, have resulted in further improving the manufacture, and also in determining more accurately the properties of gun-cotton. Abel's process consists in steeping cotton-waste in strong nitric and sulphuric acids at a low temperature, and afterwards wash-

ing it thoroughly. It is next reduced to a pulp in a common rag-engine (see PAPER), and then in the pulpy condition it is washed again in a large quantity of water to remove every trace of free acid. After that, it is pressed at a low power, and subsequently in a powerful hydraulic press, out of which it comes in so wet a state as to be uninflammable. Gun-cotton can thus be compressed into masses of any shape, as cylinders or cubes, and of any required density or hardness. It can also be converted into the form of paper, or into gun-cotton grains for sporting purposes.

Gun-cotton can now be manufactured so as to keep, there is every reason to believe, with perfect safety in a wet state, and be as good as ever when dried again. The results of some experiments carried on a year or two ago by a government committee at Chatham showed that when gun-cotton is firmly confined, it exerts a destructive effect equal to about five times that of gunpowder.

Prof. Abel has proved that the more thoroughly gun-cotton is compressed, the more perfectly can its action be controlled, and it is now generally used in compact disks for mining purposes; that it is sympathetic, so that, if gently ignited by a spark, in the form of yarn, it smolders slowly away; if by a flame, it burns up rapidly; and if fired in the compressed state by a detonating fuse, it explodes with great violence, even when unconfined. The most recent and striking discovery regarding it, however, is, that although, as a rule, non-inflammable and non-explosive in the wet state, yet, when fired in this condition with the detonating substance fulminate of mercury, and a little dry gun-cotton or gunpowder, it explodes with as much violence as when it is dry.

While gunpowder does not explode at a lower temperature than 600° F., gun-cotton has been known to do so at 277° F., and cannot be heated to 400° F. without explosion. Gun-cotton produces neither smoke nor fouling when fired, and does not heat the gun so much as gunpowder, though, by the rapidity of its explosion, it strains the barrel more.

GUN-COTTON. [*From Supplement.*] During the last few years, great improvements have been effected in the manufacture and application of this material, and in consequence, its use is rapidly extending, especially in Great Britain, where it is found of great advantage in mining operations, owing to its not producing smoke when exploded. For the improvements as well as the invention of gun-cotton, we are indebted to Germany and Austria, the most important improvement being that of baron Lenk, consisting chiefly in the following precautions in the manufacture: 1. A perfect cleansing and drying of the cotton. 2. The use of the most concentrated and purest acids procurable commercially. 3. Steeping the cotton a second time in a mixture of the strong acids. 4. Continuance of this steep for 48 hours. 5. A thorough purification of the gun-cotton from free acid by washing in a running stream for several weeks. This may be supplemented by washing in a weak solution of potash, but is not absolutely necessary. The following are the important advantages insured by the new method of making gun-cotton:

For Purposes of Artillery.—1. The same initial velocity of the projectile can be obtained by a charge of gun-cotton one-fourth of the weight of gunpowder. 2. There is no smoke from the explosion of gun-cotton. 3. Gun-cotton does not foul the gun. 4. Gun-cotton does not heat the gun to the injurious degree of gunpowder. 5. Gun-cotton gives the same velocity to the projectile with much smaller recoil of the gun. 6. Gun-cotton will produce the same initial velocity of projectile with a shorter length of barrel. 7. In projectiles of the nature of explosive shells, gun-cotton has the advantage of breaking the shell more equally into much more numerous pieces than gunpowder. 8. When gun-cotton is used in shells instead of gunpowder, a quantity equal in weight to one-third of the latter produces double the explosive force.

For Civil Engineering and Mining.—9. In driving tunnels through hard rock, a charge of gun-cotton of given *size* exerts double the explosive force of gunpowder, so as to render a smaller number of holes necessary. 10. Gun-cotton also may be so used as, in its explosion, to reduce the rock to much smaller pieces than gunpowder, and so facilitate its removal. 11. As gun-cotton produces no smoke, the work can proceed much more rapidly, and with less injury to the health of the miners. 12. In working coal-mines, the advantages of bringing down much larger quantities of material with a given charge, and the absence of smoke in the explosion, enable a much greater quantity of work to be done in a given time at a given cost. 13. The weight of gun-cotton required to produce a given effect in mining is only one-sixth part of the weight of gunpowder. 14. In blasting rock under water, the wider range and greater force of a given charge is a great element in cheapening the cost of submarine work. 15. The peculiar local action of gun-cotton, to which the effects of gunpowder show no analogy, enables the engineer to destroy and remove submarine stones and rocks without the preliminary delay and expense of boring chambers for the charge.

For Military Engineering.—16. The smaller weight of gun-cotton offers great advantages in facility of transport, the weight being one-sixth that of gunpowder. 17. The peculiar localized action of gun-cotton enables the engineer to destroy bridges and palisades, and to remove every kind of obstacle with great facility. 18. For submarine explosion, either in attack or defense, gun-cotton has the advantage of a much wider

range of destructive power than gunpowder. 19. For the same purpose, gun-cotton, from its lightness, has the advantage of keeping afloat the water-tight case in which it is contained, while the gunpowder sinks to the bottom.

For Naval Warfare.—20. Where guns are close together, as in the batteries of ships and casemated forts, the absence of smoke removes the great evil of the firing of one gun impeding the aim of the next, and thus gun-cotton facilitates rapid firing. 21. Between-decks also, the absence of smoke allows continuous rapid firing to be maintained. The absence of fouling and of heating are equally advantageous for naval as for military artillery. Of late, gun-cotton has come to be extensively used for charging torpedoes of various kinds, especially in the English, American, and German naval service.

General Advantages.—Time, damp, and exposure do not alter its qualities when carefully prepared. Being made in the form of rope, yarn, or, according to the most recent improvement, in compressed disks, accidents cannot arise from spilling, as in gunpowder. As it can be exploded in a wet condition, provided a small quantity close to the detonating apparatus be dry, gun-cotton can be stored wet, and the risk of accidents can in this way be in a great measure avoided. The dreadful explosion at the gun-cotton mills, Stowmarket, in 1871, threw doubts on the safety of this substance. However, the works at Stowmarket were rebuilt, and government manufactures this explosive in large quantities at Waltham Abbey. Gun-cotton is not now much in demand for artillery purposes, but it is more or less used for mining and quarrying in several parts of England.

GUNDULF, perhaps "a reformer before the reformation," in the 11th c. gathered disciples around him in the n. of France, particularly in Arras and Liege. He may have been an artisan who had settled in that region because of the flourishing condition of manufactures there, and among his fellow-workmen found or made disciples to his religious views. His greatest success was prior to 1025, in which year a company of his followers were arrested by Gerhard, bishop of Cambrai and Arras, and brought to trial for spreading heretical doctrines. According to the rules which they avowed they were persons who had forsaken the world, were striving to keep the flesh in subjection, to support themselves by their industry, to be honest in their dealings and to love all who were willing to join them. In their assemblies they were accustomed to pray and to wash one another's feet. But Gerhard, affirming that he had obtained from some of their proselytes a knowledge of their faith and practice, charged them with rejecting the Roman Catholic church, the pope's supremacy, the hierarchical system and even all clergy whatever; and with saying that "dogmatic, liturgic, and constitutive traditions are worthless; all the sacraments of the Roman Catholic church are to be rejected; the consecrated elements of the Lord's supper are nothing more than what they appear to our senses; at the last supper Christ did not really give his disciples his body for food and his blood for drink; marriage is to be avoided; church buildings are not holy, hence worship does not derive any special virtue from being offered therein; the altar is only a heap of stones; fumigations, and the ringing of bells are useless ceremonies; crosses, crucifixes, images tend to idolatry." But although Gerhard charged the followers of Gundulf with believing these doctrines, they would not avow them. They defended only their opinions concerning baptism, to show the inefficacy of which, as an outward rite, they pointed to the immoral lives of the clergy who administered, and of the people who received it, as well as to the fact that in the children baptized, not one of the conditions was to be found on which all efficacy must depend—no consciousness, no will, no faith, no confession. But at length, under the combined influence of the bishop's arguments and of torture, they agreed to recant their errors. Then Gerhard and other members of the synod pronounced a condemnation of the heresy, excommunicated the authors of it, if they did not repent, and compelled the prisoners to sign a statement of the true Roman Catholic doctrine before they were released. A copy of the proceedings was sent also to the bishop of Liege. The acts of the synod are the only source from which knowledge of this sect can be obtained; and after the trial neither Gundulf nor his followers can be traced. If they continued to hold their opinions they did so in secret. Similar sects existed at all times in the Roman Catholic church and, so far as the facts concerning them can be discovered, they seem generally to have been seekers after truth and godliness, in an age whose corruptions had dishonored the Christian name.

GUN FACTORIES, Royal, are government establishments at Woolwich for the construction of great guns for the use of the British army and navy. For a very long period there had been at Woolwich a small factory for the manufacture of brass cannon, but guns of cast-iron were obtained from private foundries by contract. At last it was determined that government should become in part its own gun-founder, and extensive work-shops were erected in 1855—6. The adoption of the Armstrong wrought-iron gun into general use in the service, in 1859, arrested the further making of cast-iron guns, and occasioned again a great expenditure in the erection of shops and costly machinery, which have since been adapted to the other systems of wrought-iron ordnance adopted into the service under the name of "Woolwich." The factories may now fairly be regarded as among the most remarkable sights in the kingdom. In each department, whatever the process, it is repeated over and over again, till long parallel

lines of similar mills are seen, each busily fashioning a separate gun. Iron at red-heat is first wound round a solid core (representing the bore of the future gun), as tape might be round a pencil; and then by the action of successive blows from a steam-hammer (there is one of 100 tons), the strips are welded into a compact cylinder of wrought-iron of extreme density. This cylinder, after undergoing several heatings and poundings with the steam-hammer, is encompassed with wrought-iron rings of immense strength, which are shrunk on, and then transmitted to the boring-mill. Here the proper caliber is imparted to it; in another department, the bore is rifled; in another, the outside of the gun is carefully turned; and in yet another, the whole is polished and browned. A gun is several weeks in its passage through these many processes. By the ingenuity of sir William Armstrong, the superintendent, and Dr. John Anderson, his able assistant, every part of the difficult manufacture has been reduced to a question of machinery. Many thousand guns have to this time been turned out complete, of which upwards of 7,000 are now available for military or naval use. The cost of the guns as now made is, on an average, as follows: 12-pounder, £82; 20-pounder, £124; 40-pounder, £206; 70-pounder, £375; 35-ton gun, £2,156. The royal gun-factory at Woolwich was estimated to cost for 1878—9 the sum of £203,948, of which £5,242 were for management; £78,656 for the wages of artificers and laborers; £12,671 for buildings and machinery; and £104,190 for stores to be consumed in the manufacture of guns.

Much of the machinery now used in the manufacture of guns was originally developed at the engineering and founding establishment of sir William Armstrong and Co., at Elswick, which was for some time used as an auxiliary and supplement to the gun-factory in Woolwich arsenal, the guns being turned out at a contract price, payable after they had passed a rigid inspection. The connection between the government and the Elswick firm ceased in 1863.

GUNDAMUK', a village of Afghanistan, claims notice merely in connection with the fatal retreat from Cabul in 1842. It was here that the last remnant of the British force, when within 28 m. of the shelter of Jellalabad, was massacred, to the number of 100 soldiers and 300 camp-followers, only one man effecting his escape.

GUNDUK', a river of India, joins the Ganges from the left or n. side, opposite to Patna, after a s.e. course of about 400 miles. It is supposed to rise beyond the Himalayas, in lat. 29° 40′ n., and long. 83° 14′ e., while its remotest source within that range is said to be at the foot of Dhwalagiri. After a course of 200 m. it becomes practicable for boats of considerable burden. Near this point the river touches the British territory, dividing it for 15 m. from Nepaul.

GUNDULITSCH, IWAN, the most celebrated Serbian poet of earlier times, was the son of Francis Gundulitsch the historian, and was born Aug. 8, 1588, in the town of Ragusa. After he had completed his primary education and philosophic studies under the Jesuits, he betook himself, at the age of 21, to the science of jurisprudence, in which he made such rapid advances, that in spite of his youth, he was intrusted with the first offices of the Ragusan republic. He died in 1638. On Dec. 20, 1838, the bicentenary anniversary of his death, a grand requiem was sung in memory of the poet, in the Academic church of Agram.—Gundulitsch's poetical works, lyrical, dramatic, and epical, are a faithful mirror of the stirring time in which they were composed. He was the earliest dramatic writer of the Slavic race, and the theater of Ragusa, in which his pieces were performed, was the first Slavic theater. His greatest and most celebrated work is an epic, *The Osmanli*, in 20 cantos, in which he sings the deeds of Osman II., and the fame of the Poles and their king, Wladislaw IV., in the campaign of 1621. This work was first published at Ragusa in 1626; the latest edition is that of Gaj (Agram, 1844). Of his dramas, may be mentioned *Ariadne*, *The Rape of Proserpina*, *Galatea*, *Diana*, *Armida*, *The Sacrifice of Love*, *Ceres*, *Cleopatra*, *Adonis*, and *The Coral;* of his other poems, *Hymn on the Greatness of God* and *The Tears of the Afflicted Son.* Gundulitsch also made several translations from the Italian poets.

GUNMAKING, GUN-TRADE. Although the terms gunnery and gun relate chiefly to great guns or cannon, the word gunmaking is always applied to the manufacture of small-arms, comprising muskets, rifles, pistols, and carbines. In England the great seat of this trade was formerly London, whose workmen stood unrivaled throughout Europe for the excellence of their production; but of late years the gunmakers of Birmingham have succeeded, from local advantages, in turning out barrels of proved power, at such a price as to defy competition. Since then the London makers have confined themselves to "finishing," or putting together, an art requiring the utmost nicety; and even in this, the skilled labor of Dublin and Edinburgh has now nearly equaled them. There are, therefore, several centers now in the United Kingdom whence first-rate arms are to be obtained. America and the leading continental nations are great manufacturers also, and each has its particular excellences. The chief continental gun-factories are at St. Etienne, Liege, Vienna, and Suhl.

Machinery has been comparatively slow in being applied to the manufacture of small-arms, but during the last few years it has made giant strides; and now the government manufactory at Enfield, in which numerous ingenious machines have been introduced from the United States, is fitted with every mechanical appliance, and can turn out

many thousand arms per annum, each of which so exactly corresponds to pattern, that all the constituent pieces are interchangeable. Barrels, instead of being forged by the hand-hammer, are rolled at once with a uniform pressure, and then welded at one heat. In the United States, barrels are at present made of cast-steel, first formed in the solid, and then bored by a succession of borers of increasing diameter. These cast-steel barrels are rapidly superseding all others—at least for sporting purposes—in Great Britain, France, and America. Another favorite modern material for barrels is "laminated steel." See BARREL. Barrels well constructed with laminated steel resist a bursting pressure of 82,000 lbs. on the square inch, one-eighth of an inch thick, whereas common "twist" barrels will only withstand about 34,000 lbs.

When the barrel is finished, however made, it is proved, under very heavy charges of powder. All non-government barrels made in England must be proved at the proofing houses of London or Birmingham; government arms are tested at Enfield.

The portions of the lock (q.v.) are made some of iron and some of steel, either forged by hand, or, as in the great manufactories, stamped out by a powerful machine. The stock is turned by machinery from strong light wood. On all accounts taken together, it is found that no wood is so well adapted as Italian walnut. The finishing or putting together of guns is an art in itself, the utmost attention having to be devoted to everything that will secure solidity, lightness, and the most minute accuracy of fitting. Skilled artificers in the gun-trade command excellent wages; rarely less than 40*s.*, and often as much as £4 a week.

In fitting and finishing, London is generally admitted to stand unequaled; Paris, however, making a good and near second. For barrels, Birmingham, St. Etienne, and Liège have the most repute. In all respects, Toledo, once famed for its blades, holds a high character in regard to its guns, both for sporting and military purposes. In the United States, Windsor and Hartford are the leading manufactories, with Harper's Ferry for government arms; but the quality of American workmanship is too often sacrificed to cheapness in the article turned out. The British export trade in small-arms is very great, the return for the year 1875 showing an exportation of 318,901 stand of all kinds, of the value of £655,169.

GUNNEL, *gunnellus*, or *murænoides*, a genus of fishes of the blenny (q.v.) family, of more elongated form than the true blennies. The species are pretty numerous, but only one is British, the COMMON or SPOTTED GUNNEL or BUTTERFISH (*G. vulgaris*), often to be found in tide-pools on the sea-shore; seldom more than 6 or 7 in. long, of a deep olive color, with a row of dark spots on the back, remarkable for the quantity and thickness of the mucous secretion with which it is covered. It is seldom used in Britain except for bait.

GUNNER, in the British army, is the private soldier of the corps of artillery; he receives pay at the rate of 1*s.* 2½*d.*, per diem: his uniform consists of blue with red facings, and red stripes on the trousers; and his arms consist of a carbine and sword-bayonet.

At the present time, when artillery is used with the utmost skill and science, the training a gunner must undergo, to become thoroughly efficient, is long and arduous. His eye must be sufficiently acute to estimate distances instantly and proximately; and withal, he must possess physical strength capable of sustaining the exertions necessary for the service of heavy guns and the removal of shot and ponderous artillery stores.

Master-gunners are pensioned sergeants of artillery, who are placed in charge of the stores in small towers or forts; they are divided into three classes, of which those in the first class receive 5*s.*, in the second 3*s.* 6*d.*, and in the third, 3*s.* a day. Master-gunners are now borne in the coast brigade of royal artillery, but the office has much degenerated in importance since it was first created, at least as early as the time of Henry VIII.

In the navy, the *gunner* ranks first among the warrant-officers, and next in order to the navigating sub-lieutenant in regard to taking command of a ship. His pay varies from 9*s.* a day for chief gunners to 5*s.* 6*d.* a day for gunners of the second class. His uniform consists of a blue coat, blue cap, and officer's sword. A gunner rises from before the mast by steadiness, sobriety, and intelligence. On appointment, he must satisfy examiners appointed by the admiralty that he is in all respects qualified. His duties are highly important: he has charge of all powder and artillery stores on board, and is bound to see that the guns are always fully equipped for action. In exercising with the guns, the gunner is instructor of the sailors, and, under the captain, is responsible for their efficiency. The *gunner's-mate* is assistant to the gunner, and stands second among the petty-officers. To be confirmed in his rank, he must pass an examination in gunnery on board H.M.S. *Excellent*, at Portsmouth. His pay varies from £39 10*s.* 10*d.* a year to £34 19*s.* 7*d.* *Seamen-gunners* are continuous-service sailors, who are trained in gunnery and great-gun exercise. One has the direction of each gun, with ordinary seamen under him to perform the heavy part of working it. A seaman-gunner, if in the first class, receives 4*d.* a day beyond his pay as seaman, and 2*d.* a day if in the second class.

GUNNERY. Ignorance of the laws of gravity and of other physical circumstances affecting the flight of projectiles, prevented any correct theory of gunnery being arrived

at in the earliest stages of artillery. The first author professedly treating on the flight of cannon-shot was Nicholas Tartaglia, a distinguished Italian mathematician, who, in 1537, published his work, *La Nuova Scientia*. He had no practical acquaintance with his subject, but his guesses were shrewd and often marvelously near the truth. Among other things he ascertained that no portion of the track described by a ball is a right line, and as a practical aid to artillerists, he devised the gunner's *quadrant* (q.v.). After Tartaglia, many philosophers, especially of Italy, theorized on the question, and various tables of ranges, elevations, charges, etc., had been published, all more or less fallacious, when a nearer approach to accuracy appeared in Galileo's *Dialogues on Motion*, printed in 1638. The officers who had charge of artillery in actual use were too little gifted with scientific education to deduce theory from practice; and up to the time of Robins, who wrote in 1742, but four working-gunners—Collado, Browne, Eldred, and Alderson, of whom the last three were Englishmen—have left treatises of any value on the use of their weapons.

Galileo, in his contributions to physics, had shown that cannon-shot, or any other projectiles, being affected by the downward force of gravity, would travel in the curve of a parabola, unless affected by the resistance of the air. The philosopher pointed out modes by which the disturbances caused by this resisting medium might be ascertained; but subsequent writers, with the exception of Newton and Bernouilli, till the time of Robins, chose to assume that the atmospherical resistance was but nominal, and boldly asserted that all shot described parabolas in their course. In 1742 Mr. Benjamin Robins, who must be considered the real founder of the science, published his *New Principles of Gunnery*, a work the result of long and almost exhaustive experiments. He treated of the atmospheric resistance, of the force of gunpowder, of the effects of varying length and weight in guns, and of almost everything which in any way related to the motion of projectiles, carrying the theory of gunnery nearly to perfection. As one result of his experiments, Robins established the law that common shot encountered a resistance from the air during their passage, which increased as the square of the velocity, or very nearly so; and that their courses differed widely from parabolas. By means of the ballistic pendulum (q v.) he measured the speed of balls at the very cannon's mouth. Euler, in the latter part of the 18th c., added much to the knowledge of the subject by his commentaries on the work of Robins, as did also the mathematician Hutton.

The theory of gunnery, so far as it can be deduced from the universal laws of motion, without regard to the resistance of the air, falls under the more general head of projectiles (q.v.). But except in firing bombs, which from their low velocity are not so much affected by the resistance of the air, the mere mathematical theory is of little service. All the real practical rules have been deduced from experiment. The following are a few of the more important results thus arrived at:

For a given charge and weight of projectile, there is a certain length of bore that gives the greatest velocity; the cause being, that with a less length some of the powder is discharged undecomposed, and with a greater, the combustion is finished before the ball leaves the muzzle, so that it has to contend with the friction of the gun without receiving additional impulses. Increase of length, accompanied by proportionate increase of charge, gives increased velocity; but the greater velocity is only in proportion to the cube root of the increased length.

The resistance of the air does not arise merely from the projectile having to displace its own bulk of it as it advances; for in the case of a body moving with great velocity, the air becomes condensed in front of it, while that behind is highly rarified. The displaced air behind does not return freely to fill up the vacuum, until the speed of the ball is reduced to 1400 ft. per second; the maximum profitable velocity is calculated to be 1600 ft. and that, or any higher speed, is believed to be reduced to 1400 ft. after a course of 400 ft.

The resistance offered to bodies by the air is as their surfaces, i.e., in the case of round or cylindrical shot, as the squares of the diameters; whilst the power of the bodies themselves to overcome resistance is as their weights, or as the cubes of their diameters. Of course balls of like size but different density will produce widely different results. Hence the greater range of solid as compared to hollow shot. Solid shot fired with equal velocities and elevations, range as their weight, the heavier overcoming atmospheric resistance better than the lighter. Shot of equal weight and diameter will range according to their velocities; but not in direct proportion, for the retarding power varies as the square of the velocity. Velocities of shot of equal diameter are as the square roots of the charges.

The diminution in speed caused by atmospheric resistance may be judged of from the following table of the speed of a 32-pounder at different parts of its course; it being premised that a body in vacuo, once started, should move *ad infinitum*, without decrease of velocity:

Initial velocity				.....	1600	feet	per second.
Velocity	500	yards	from gun	.....	1126	"	"
"	1000	"	"	.....	1000	"	"
"	1500	"	"	.....	608	"	"
"	2000	"	"	.....	465	"	"
"	2500	"	"	.....	367	"	"

Action and reaction being always equal and in opposite directions, the explosion of the gunpowder acts with equal force upon the ball and upon the cannon from which it is discharged, the former demonstrating this in its range, and the latter by its recoil. This recoil has to be guarded against as much as possible, either by the weight of the gun itself, or by its secure attachment to a ponderous carriage. The momentum of the recoil, being the product of the shot's weight, and the velocity, is readily calculated. The common charge of a 24-pounder gun, being one-third the weight of the shot, or 8 lbs., the momentum of both shot and gun, will be 1600 (the initial velocity) × 24 = 38,400, which, divided by 5,600, or the gun's weight in pounds, gives about 7 ft. as the velocity per second; if the gun is attached to a carriage, the weight of the carriage must be added to that of the gun for a divisor.

The following table exhibits the effects of varying charge and elevation on different kinds of guns. The line of sight of a gun is an imaginary line drawn through the back-sight on the breech and the fore-sight, a notch in the muzzle ring, or on the first re-inforce. The fore-sight is immovable, but the back-sight is so constructed that the notch shall be at a greater or less height above the axis of the gun. When the line of sight is parallel to the axis and horizontal, the discharge is "point-blank;" but when the back-sight is raised, the direction of the axis of the gun will be to a point more elevated than that to which the line of sight is directed. Consequently, by raising the back-sight, a greater elevation, and, ordinarily, a greater range, is given to the piece. In regard to point-blank discharge, Tartaglia established the fundamental proposition that the time occupied by the ball in describing the whole trajectory or path is the same as it would require to fall by gravity from the muzzle to the ground.

Nature.	Elevation.	Charge.	Range in Yards.
12-pounder iron gun	Point-blank,	4 lbs.	300
	1 degree,	"	700
	3 degrees,	"	1200
	6 "	"	1800
12-pounder Armstrong	Point-blank,	1 lb. 8 oz.	330
	1 degree,	"	700
	3 degrees,	"	1425
	6 "	"	2440
	10 "	"	3590
32-pounder iron gun	Point-blank,	10 lbs.	390
	1 degree,	"	790
	3 degrees,	"	1500
	6 "	"	2220
	12 "	"	3060
40-pounder Armstrong	Point-blank,	5 lbs.	360
	1 degree,	"	730
	3 degrees,	"	1455
	6 "	"	2505
	12 "	"	4470
68-pounder iron gun	Point-blank,	20 lbs.	400
	1 degree,	"	950
	3 degrees,	"	1715
	6 "	"	2465
	12 "	"	3400
110-pounder Armstrong	Point-blank,	12 lbs.	345
	1 degree,	"	680
	3 degrees,	"	1335
	6 "	"	2280
	12 "	"	4035

As regards penetration, it was found by experiments against a martello tower at Eastbourne, with a range of 1832 yards, that solid shot from the 40-pounder Armstrong penetrated into good masonry from 47 to 65 in., and from an 80-pounder Armstrong 51 to 90 inches. For other particulars relative to the art of gunnery, the reader is referred to LOADING, PROJECTILES, WINDAGE, etc. The important point of the rotation of a ball or bolt will be considered under RIFLED FIRE-ARMS.

GUNNY BAGS are bags made of a coarse kind of cloth or sacking, manufactured in India, and chiefly in Bengal, from which they are largely exported to other parts of the world. The fiber of which the cloth is made is chiefly that of the same species of *corchorus*, which yield the jute (q.v.) of commerce. The cotton of America is mostly packed in gunny bags, of which the number exported to America from Bengal has increased from thousands in the year 1796 to millions in 1874. Great quantities are also exported to China, Australia, and other countries. They are partly made up into bags in Bengal, partly exported as gunny *cluts* or *chuttees*, pieces of size suitable for being immediately made into bags. The manufacture of these is the great domestic industry of all the populous eastern districts of lower Bengal. It pervades all classes, and gives occupation to men, women, and children. Boatmen employ themselves in it in their spare moments, husbandmen, palanquin-carriers, and domestic servants, being Hindus, for Mohammedans spin cotton only. It "forms the never-failing resource of

that most humble, patient, and despised of created beings, the Hindu widow, saved by law from the pile, but condemned by opinion and custom for the remainder of her days, literally to sackcloth and ashes, and the lowest domestic drudgery in the very household where once, perhaps, her will was law" (Royle's *Fibrous Plants of India*). Hence the very low prices at which gunny bags are sold. There are few articles of commerce so widely diffused over the globe as the Indian gunny bag.

GUNPOWDER, a well-known explosive mixture composed of sulphur, niter, and charcoal. Of use in several trades, its principal employment is in the discharge, for war or sport, of projectiles from fire-arms, and in the processes of blasting during mining or quarrying. The history of gunpowder has been already given under fire-arms (q.v.), and it will therefore be only necessary now to consider the chemical action which takes place when powder is ignited, and then to proceed to a short description of the manufacture.

Extreme care is requisite in securing the purity of the ingredients entering into the composition of gunpowder. The principal impurity of niter or saltpeter is chloride of sodium, or common salt, which, in consequence of its tendency to absorb moisture from the atmosphere, would have a very injurious action on gunpowder by weakening its power. The details of the process of purification of the niter would be out of place in this article. The sulphur may be purified either by fusion (when the heavier impurities sink, and the lighter ones may be removed by skimming) or by distillation. The preparation of the charcoal is a most important point. It should be light and porous, should yield a very small amount of ash, especially of carbonate of potash and other deliquescent salts, and should contain little moisture. The woods yielding the best charcoal for gunpowder are black alder, poplar, spindle-tree, willow, and dogwood, the last named giving off the largest volume of gas when ignited with a given weight of niter, and being on that account especially used for rifle powder.

A vast number of experiments have been made at different times, and by different nations, to discover the proportions of niter, sulphur, and charcoal best adapted for the production of different kinds of gunpowder; and upon the whole there has been great uniformity in the results, as may be seen from the following table of the percentage composition of the powder of different nations:

Kind of Powder.	Charcoal.	Sulphur.	Niter.	Authority.
Austrian war powder.....	13.1	11.3	75.6	Linck.
English (Waltham Abbey) war powder.....	13.7	10.1	76.2	Ure.
Russian war powder.....	17.7	11.7	70.6	Meyer.
Italian sporting powder.....	18.2	8.6	73.2	Prechtl.
Chinese gunpowder.....	23.1	15.4	61.5	Prechtl.

The chemical processes which occur in the ignition of gunpowder are commonly described as follows: When the powder is ignited, the oxygen of the niter combines with the charcoal or carbon to form carbonic acid, the potassium combines with the sulphur to form sulphide (or sulphuret) of potassium, and the nitrogen is liberated; the reaction being shown in the equation $KO,NO_5 + S + 3C = 3CO_2 + N + KS$. Powder consisting of one equivalent each of niter and sulphur, and three equivalents of carbon, would contain 74.8 per cent of niter, 11.9 per cent of sulphur, and 13.3 per cent of carbon or charcoal, which approximates very closely to the Austrian powder in the above table. It is easily shown that one volume of such powder would yield 296 volumes of mixed carbonic acid and nitrogen gases, after the ordinary reduction for temperature and pressure, although from the intense heat developed at the moment of explosion the actual dilatation amounts to at least 1500 times the volume of the powder employed. The only solid residue, supposing the above equation to represent the true reaction, is sulphide of potassium (KS), and part of this is volatilized by the heat of the explosion, causing a whitish smoke by its combustion, while the part that is not burned gives the peculiar odor to the washings of the gun-barrel.

If a larger proportion of charcoal is added, more or less carbonic oxide gas is generated as a product of combustion. Blasting powder is so composed that, theoretically, it should yield on explosion a mixture of carbonic oxide and carbonic acid gases, and leave a residue of bisulphide of potassium; the reaction being expressed by the equation $KO,NO_5 + 2S + 4C = 2CO + 2CO_2 + N + KS_2$. A powder composed according to this formula would contain 64.4 per cent of niter, 20.4 per cent of sulphur, and 15.2 per cent of carbon; and the proportions actually employed are 65, 20, and 15, respectively.

Recent investigations of Bunsen and Schischkoff (Poggendorff's *Annalen*, Bd. 102, p. 321) show that in reality the chemical reactions are very far from being as simple as those given in the preceding paragraphs; the solid residue consisting of various compounds of potassium (sulphate of potash being in greatest quantity), with portions of niter and carbon.

The ignition of gunpowder must be distinguished from its combustion. The pow-

der is ignited when a portion of it begins to develop light and heat; this in granulated gunpowder communicates from grain to grain with the utmost rapidity; but still, it is important to bear in mind, by successive ignitions. Combustion means the final and total decomposition of each grain separately, and the complete liberation of its component gases. In gunpowder these phenomena follow each other so rapidly, that, unless the mass is spread over a considerable space, they *appear* simultaneous. The heat spread around by each grain during its combustion suffices to ignite all other grains within a sphere of six times its own diameter. This serves to account for the almost instantaneous communication of the flame throughout the whole quantity exposed. The granulation of gunpowder has a great influence on the rapidity of its ignition; the larger the grain, the more rapid is the ignition, but the slower the combustion. On the other hand, small-grained powder ignites more slowly, and burns with greater speed. When mealed or finely powdered gunpowder is employed, it readily inflames, from the presence of the ordinary ingredients; but there being no interstices, the conflagration spreads but slowly, and therefore the decomposition is proportionately retarded. It thus happens that mealed powder exhibits less explosive power and less rapidity of combustion the closer it is pressed together, a circumstance taken into account in the manufacture of fireworks.

In rifled guns and muskets, where it is desired that the projectile should expand to the shape of the grooves, it is obviously best to have a powder which, by very rapid ignition, creates the utmost sudden expansion, and which, by continued combustion, maintains an increasing degree of heat, which shall further augment the explosive force of the gasses evolved up to the period of time at which the projectile is driven from the muzzle of the weapon. With this object, large-grained powder is clearly the most suitable, although a contrary view has been long accepted; and that to so great an extent, that some among the recent inventors of rifled arms have had to complain that the only gunpowder they could obtain has been far *too good* for their purposes.

Process of Manufacture.—The three ingredients being taken to separate mills, are reduced by successive grindings to impalpable powder. The several materials are then taken to the *mixing-house*, where they are weighed out into their respective proportions. The charcoal is spread in a trough, and the sulphur and niter being sifted upon it, the whole are incorporated, though imperfectly, by the hands. The next process is in the *powder-mill*, where the mixture is ground between millstones, and thoroughly incorporated in a wet state. So dangerous is this part of the manufacture, that makers are forbidden to grind more than 42 lbs. in the same house at one time: all the bearings of the machinery are of copper, lest heat should be generated by the friction. According to the quality intended is the time during which this trituration is continued, from one hour to six being that usually employed, and three hours the period in the government factory. The powder, completely pulverized and caked by the moisture and the pressure, leaves the mill in small lumps, called *mill-cake*. This mill-cake is then spread between copper-plates in layers about 3 in. thick, and is subjected to an immense pressure either by a screw-capstan or by a hydraulic engine.

The next operation is graining, a process to which, as already explained, gunpowder owes its rapidity of ignition, and its consequent explosive power. This is performed by forcing the mill-cake through minute holes in a circular parchment sieve, the sieve being kept by mechanism in rapid revolution. The grains thus formed are, however, of very various sizes; and that the gunpowder should be homogeneous, it is necessary that they should be sorted into the several sizes. This is done by the intervention of a series of sieves of different degrees of fineness.

Since the introduction of the immense modern cannon, it has been found necessary to make powder with very large grain, even larger than hazel nuts, this is called *pebble powder*, and is now in general use.

The last processes are drying, glazing, and freeing from dust. The first is effected by heating the powder to a point sufficient to drive off moisture; the second, by the friction of the grains together in a revolving cylinder; the third, by the centrifugal action caused by the powder being twisted round at great speed in a gauze cylinder, when the dust (formed in the polishing) flies off through the gauze, and the bright grains remain as finished gunpowder.

This is the modern system—a system involving considerable personal risk at every stage; for the fine dust becomes so diffused through the atmosphere in the mills that the slightest spark would blow the whole into the air in a moment. The early process of manufacture was, however, even more dangerous. What with the stirring, and pounding, and spirit (which our forefathers used instead of water, in the idea that a strong fluid would impart strength to the mixture), it was probably to the impurity alone of the materials that the operators were indebted for not being blown to pieces.

The following are the chief properties of gunpowder. Good powder should be perfectly uniform in texture, and should not present any light specks or glittering points. The grains should be sufficiently hard not to be easily crushed by the fingers, or to soil them, or a piece of paper, by mere contact. If inflamed on white paper, it should blacken it but slightly, should on no account set fire to it, and should leave only a very slight residue. The temperature at which it explodes has been carefully studied by Violette, who obtained the following results:

	Angular grains.	Pulverized.
1. Blasting powder explodes at.....	518°	509°
2. War powder explodes at.....	528°.5	510°.5
3. Sporting powder, fine, explodes at.....	536°	514°.8
4. Sporting powder, extra fine, explodes at.....	603°	518°

The most combustible of these powders was the one containing the largest amount of sulphur, which is the ingredient most ready to enter into ignition. When gunpowder is exposed to a heat of 500°, the whole of its moisture is expelled, and the niter and sulphur are reduced to the fluid form. On cooling, such powder is found to be intensely black, and the grain has become indurated, and is no longer able to imbibe moisture. Powder is inflamed by any burning substance, by red-hot metal, by the electric spark, or by the violent concussion even of comparatively soft bodies, if it be sufficiently powerful. For example, powder placed upon lead, or even on wood, may be ignited by the shock of a leaden bullet fired at it. Its specific gravity is about 1.8.

The nature of the residue which is left after the ignition of the powder has been already explained. The *fouling* caused by this residue is avoided to some extent by the lubrication of the barrel with a little fatty matter.

The manufacture of gunpowder is carried on to a great extent in Great Britain; the exports in 1875 were 15,071,979 lbs., shipped principally to the colonies, and to western Africa and South America.

GUNPOWDER, Laws Relating to. In order to guard against the frightful consequences to the public likely to arise from carelessness in the preparation, preservation, or conveyance of this most dangerous article, the legislature in 1875 made stringent rules upon the subject. By 38 and 39 Vict. c. 17—an act which applies also to Scotland and Ireland—it is provided that no gunpowder shall be manufactured except at a factory lawfully existing or licensed under the act, and it shall not be kept except in the factory where it is made, or in a magazine or store duly licensed, or in registered premises. The license is obtained from the local authority (usually justices), and approved by the home secretary. General rules are imposed for regulating factories and magazines. There must be a lightning-conductor. No charcoal or oiled rags must be taken into the building except for immediate use. No smoking is allowed. Tools are to be made of wood or soft material. Workingmen's clothes are to be without pockets. Carriages and boats for conveying gunpowder must have in their interior no iron or steel exposed. Each building is to have affixed, so as to be easily read, the quantity of gunpowder allowed in each. Retail dealers must be registered, and must keep their powder in a separate house or in a fire-proof safe, not exceeding 200 lbs.; but if kept inside the dwelling-house 50 lbs., or if in a safe inside, 100 lbs. The building or safe is to have no exposed iron or steel in the interior. A breach of precautions against fire or explosion is visited with heavy penalties. The local authorities must keep registers of licensed persons, and all ratepayers can demand a copy thereof. Retail dealers, if using less than 5 lbs. for cartridges at a time, are exempted from taking out a factory license. No powder must be sold to a child under 13. All powder exceeding 1 lb. weight must be sold in a canister or case securely fitted, and with the word "gunpowder" visible. Also, powder must be closely and securely packed and labeled for conveyance, if exceeding 5 lbs., and the amount carried is not to exceed 100 lbs. All railway and canal companies are to make rules and have special times and places for loading and unloading powder. Firework factories, if making and keeping less than 500 lbs. of fireworks, need only a license from the local authority; but exceeding that quantity, one from the home secretary. To let off a firework in a street or highway subjects the offender to £5 penalty. A government inspector may at any hour of day or night enter and inspect any factory, magazine, or registered premises, and may require the occupier, under a heavy penalty, to make alterations, or take certain precautions. Search-warrants are also readily granted, and in urgent cases are dispensed with.

GUNPOWDER FACTORY, Royal, at Waltham abbey, an establishment in which much of the gunpowder required for the British army and navy is made. It is built on all the newest and most approved principles to insure safety, economy, and efficiency; but even here accidents occasionally happen in this dangerous manufacture, and roofs and sides, purposely left loose so as to offer but little resistance, are scattered to the winds. Between the different mills mud-banks are raised, and groves of trees thickly planted, to lessen the concussion, and, as far as possible, limit the catastrophe when one house is unfortunately exploded. A series of raised canals, at the same time, is ready to flood the whole place, or to afford a precarious shelter to the men employed, if time be available to make use of it. The charge for this factory for 1878–79 was £104,439, of which £20,692 were for management and wages, £19,696 for buildings, and £44,764 for raw material. There are about 200 workmen. When the gunpowder is made, it is sent down the Lea navigation, to the magazines at Woolwich and Purfleet.

GUNPOWDER PLOT, The, was a fanatical project on the part of a few Roman Catholics to destroy the king, lords, and commons on the meeting of parliament on Nov. 5, 1605. James I. had succeeded Elizabeth two years before, and his government had

exercised great severities against the Roman Catholics, not merely denying them religious toleration, but confiscating their property. A few ruined and exasperated men banded together to overthrow the government. The originator of the plot was Robert Catesby, a man of fortune, which he had impaired by youthful extravagance, and who communicated his idea to Thomas Winter, who was horrified at first, but after a time began to approve and further it. For this end he enlisted into the conspiracy Guy Fawkes, a soldier of fortune, of considerable military experience, and a most determined and fearless character. Catesby enlisted other two, by name Wright and Percy —the latter a relation of the earl of Northumberland. They hired a house and garden contiguous to the parliament house, and commenced their mine, part working when the others slept, and the rubbish being buried during night. One day they were alarmed by a noise after they had with much labor pierced the wall three yards thick. Fawkes learned that this noise proceeded from a cellar under the house of lords, which would soon be vacant. He hired it, and barrels of gunpowder were placed in it, and stones and billets of wood placed over them, for the double purpose of concealment and to act as destructive missiles when the gunpowder was fired. In the interval, a brother of Wright and a brother of Winter had been added to the conspirators, so they were now seven. But they wanted money; and to supply it, two others were induced to enter this fanatical copartnery, and these were sir Everard Digby of Gatehurst, in Buckinghamshire, a young gentleman of large estates; and Francis Tresham, a follower of Essex, like Catesby and Percy, but, unlike them, a selfish unenthusiastic man—not a man at all suitable for conspiracy, except that he had £2,000 to contribute. Their plan was finally arranged for the reassembling of parliament, which was to take place on Nov. 5. Guy Fawkes was to fire the mine (if the gunpowder in the cellar may be so called), and then flee to Flanders by a ship provided with Tresham's money, and waiting ready on the Thames. All the Roman Catholic peers and others whom it was expedient to preserve were to be prevented from going to the parliament house by some pretended message or other, on the morning of the day. After all was ready, lord Mounteagle was at supper at his country-house at Hoxton, where he very seldom was. As he sat, a page handed him a letter received from a stranger, advising him "to devise some excuse to shift off your attendance at this parliament, for God and man hath concurred to punish the wickedness of this time." That this letter was written by or for Tresham, who was lord Mounteagle's brother-in-law, there can be little doubt. That he desired to save him was certainly one reason for writing it; that he desired to save the conspirators, or at least to allow them to escape, is very probable; and that they might have escaped, but for the fanatical hopes of Catesby, is all but certain. It is also probable that lord Mounteagle had been fully informed of the whole matter by Tresham, and that the supper in the country and the letter were mere devices to conceal Tresham's treachery. When the letter was formally communicated to the king, he at once declared its meaning, and the most simple way of accounting for his power of divination is to suppose that, like lord Mounteagle, he had been told beforehand. On the very evening of the 4th, the lord chamberlain and lord Mounteagle visited the parliament house, and entering the cellar in a casual way, told Guy Fawkes, whom they found there, and who passed as Percy's servant, that his master had laid in plenty of fuel. Only fanaticism gone the length of fatuity could have made him persevere after this. But he did, though escape was still possible; and on the morning of the 5th, a little after midnight, he was arrested coming out of the cellar, dressed as for a journey. Three matches were found on him, a dark-lantern burning in a corner within, and a hogshead and 36 barrels of gunpowder. He was examined and tortured. He confessed his own guilt, but would not discover his associates. However, he and the chief of them were either killed on being captured, or died on the scaffold; except Tresham, who at first walked about openly, but at last was apprehended, and died of a natural disease in the Tower. The memory of this plot, invested by much fiction, has survived in England; and it was not more diabolical than hopeless and mad. It was in itself mysterious, and for purposes of state policy and Protestant zeal, a further mystery was thrown over it. No name in English history has been more detested than that of Guy Fawkes (q.v.).

GUNROOM, in British line-of-battle ships, is the common cabin of officers below the rank of lieutenant (with the exception of the assistant-surgeon, who sits in the wardroom). In frigates and smaller vessels, the gunroom is the common cabin of the lieutenants, master, surgeon, assistant-surgeon, paymaster, marine officers, chaplain, and chief engineer; the junior officers being in those cases consigned to the cockpit.

GÜNS (Magyar, *Köszegh*), a small t. of Hungary, situated on a river of the same name, about 57 m. s.s.e. of Vienna. It is inhabited almost wholly by Germans, who are the descendants of Bavaro-Frankish colonists that settled here in the 9th c., and who speak a dialect differing from any other German dialect. Fruit and wine are largely cultivated. Pop. '69, 6,915. Güns made itself for ever famous by its noble defense for 28 days against the Turkish army under Solyman in 1542. This defense not only forced the Turks to retire, but afforded time for the emperor Charles V. to assemble a force strong enough to oppose them.

GUNSHOT WOUNDS may vary in severity from a simple bruise to the tearing away of a whole limb. Single balls produce a cut, bruised or lacerated wound, according to

the amount of their velocity when they strike the body. The effects of small shot vary with the distance and power of the gun; when close, the charge enters with the pellets so close together as to make one wound like a single ball. Some years ago, it was commonly believed that the "wind of a large shot" could produce serious injuries: this belief may have arisen from the circumstance that when a heavy ball, which has lost some of its force, strikes the body at a particular angle, the skin does not always give way, but the deeper structures, such as the muscles, or large organs, as the liver, may be completely crushed. If the wind of a shot could kill a man, it is not likely that soldiers should have had ears, noses, and lips shot off, and yet have experienced only the symptoms produced by those slight injuries.

When a bullet passes out of the body, there are two openings—that of "entrance," which is generally depressed, round, regular, and smaller than that of "exit." The modern conical ball makes a well-defined oblong wound, but it may shift its direction. so as to strike longitudinally, and cause a more extensive injury to the skin. When a bullet strikes the shaft of a bone, it cracks or splinters it, and either remains or passes through the cancellated ends. In its course, the ball may carry before it pieces of cloth, coins, or other foreign bodies, which increase the danger of the wound. Many persons who have been shot during the excitement of battle, describe the sensation as resembling the sharp stroke of a cane; but in most instances the wounded man soon begins to tremble, as if in an ague-fit, complains of cold, his face becomes pale, his pulse scarcely perceptible, and he appears as if about to die. This is the condition termed *shock;* and though death sometimes does ensue during this state of prostration, it is not so serious as it appears, and the patient will probably pass out of it in a few hours with the help of stimulants and rest. Although excessive bleeding is not so common after gunshot as other kinds of wounds, it may occur immediately to a fatal extent, if assistance be not afforded. This assistance any one can give; it consists simply in placing the fingers in the wound, and if the vessel can be reached, pressing them upon it, directed to the proper point by the warm gush of blood. Should the wound be too small to admit the finger, a handkerchief may be tied round the limb above the wound, and twisted tightly with a stick. It is well to examine the wound, to ascertain the extent of the injury done, and whether there are splinters of bone or portions of dress lying in it, which should be removed. But neither the examination nor the removal should be attempted if they seem likely to aggravate the injury. The treatment is similar to that of other wounds, and consists in protecting the part during the healing stages, moderating inflammation by cold-water dressings or soothing poultices, and hastening the last stages of cure by stimulating lotions. During his illness, the general treatment of the wounded man must depend upon so many different circumstances, that it would be out of place to enter upon them here.

GUNTER, EDMUMD, an English mathematician, was b. in Hertfordshire, in the end of 1580 or the beginning of 1581. He was educated at Westminster school, and afterwards at Christchurch college, Oxford. While at Oxford, he gave his attention principally to the study of mathematics, and in 1606 invented the sector, with the lines known as Gunter's Scale. Subsequently, he took orders, became a preacher, and took the degree of B.D. But the bent of his mind being strongly towards mathematical studies, he obtained the professorship of astronomy in Gresham college on Mar. 6, 1619. He died Dec. 10, 1626. The principal works of Gunter are the two following: *Canon Triangulorum* (Lond. 1620), a table of logarithmic sines, etc., to seven places of decimals, being the first table published in accordance with Briggs's system; in this work, we find for the first time the words "*co*sine," "*co*tangent," etc.; *Of the Sector, Cross-staff, and other Instruments* (1624). We also owe to Gunter the invention of the surveying-chain (see next article), and the first observation of the variation of the compass.

GUNTER'S CHAIN—GUNTER'S SCALE. *Gunter's chain,* so named after its inventor, is that commonly used by surveyors in measuring land. It is 66 ft. long, and its convenience in practice turns on the fact, that ten square chains make one acre. The chain is divided into 100 links, and thus 100,000 square links make an acre.

The name of *Gunter's Scale* or *Gunter's Lines,* is usually given to three lines to be seen on almost any sector, and marked N, S, T, meaning the lines of logarithmic *numbers,* of logarithmic *sines,* and of logarithmic *tangents.* To understand their construction and use requires a knowledge of logarithms; they are explained in every school-book of practical mathematics. The distances of the divisions marked 1, 2, 3, etc. on the line of log. numbers, represent the logarithms of those numbers—viz., 0, .301, .477, etc.,—taken from a scale of equal parts. The other lines are constructed on an analogous plan. Calling to mind that multiplication of numbers is effected by the addition of the logarithms, division by their subtraction, involution by their multiplication, and evolution by their division, we are able to perceive with what ease many *rough* problems in areas, heights, cubic contents, and other matters may be performed through the agency of Gunter's scale.

GUNTUR, or GUNTOOR, one of the districts in Hindustan on the w. side of the bay of Bengal, called the northern circars. It is between 15° and 17° n. and s. of the

river Kistnah, which separates it from Masulipatam. It is the most southerly of the northern circars, and comprehends an area of about 3,500 sq.m.; exclusively of the mountainous district of the west. This district was the jaghire of Bassalut Jung, the brother of the nizam, when lord Clive obtained, in 1765, the northern circars from the Mogul, on which account he was allowed to retain it during his life; but after this it was to devolve to the company. It is a low, flat country, better calculated for growing rice than the more valuable grains. Its principal seaport is Mootapilly; and its chief town is Guntoor, the population of which is estimated at 20,000. The Guntoor territory now forms one of the districts under the Madras presidency, into which the northern circars were divided when the present Madras judicial and revenue system was established. Guntoor is the capital.

GUNTUR', a t. in the presidency of Madras, stands about 18 m. to the s. of the Kistna or Krishna, and about 30 to the w. of the bay of Bengal, in lat. 16° 20′ n., and long. 80° 30′ east. It contains about 20,000 inhabitants; and though badly built and much overcrowded, it is yet understood to be a healthy place. The district of Guntur is now merged in the collectorate of Kistna or Krishna.

GUNWALE, a term used on shipboard, rather vaguely, to designate the upper portion of the side of a ship or boat.

GURDÁSPUR, a British district in the Punjab, India, 1822 sq.m.; pop. '68, 906,126. The district occupies the submontane portion of the Bári Dóab, or tract between the Bias and the Ravi. An intrusive spur of the British dominions runs northward into the lower Himalayan ranges to include the mountain sanatarium of Dalhousie. This station crowns the most westerly shoulder of a magnificent snowy range, the Dháola Dhár, between which and the plain two minor ranges intervene. Below the hills stretches a picturesque and undulating plateau covered with abundant timber, made green by a copious rainfall, and watered by the streams of the Bári Doáb, which, diverted by dams and embankments, now empty their waters into the Bias directly, in order that their channels may not interfere with the Bári Doáb canal. The district contains several large and important *jhils* or swampy lakes. Few facts can now be recovered with regard to the early annals of Gurdáspur. Our first distinct historical knowledge began with the rise of the Sikh confederacy. The whole of the Punjab was then distributed to the chiefs who triumphed over the imperial governors. In the course of a few years, however, the famous Ranjít Sinh acquired all the territory which those chiefs had held. Pathánkot and the neighboring villages in the plain, together with the whole hill portion of the district, formed part of the area ceded by the Sikhs to the East India company after the first Sikh war in 1846. In 1861–62, after receiving one or two additions, the district was brought into present shape, having its head-quarters at Gurdáspur.

GURGAON', a district of the Punjab, in the commissionership of Delhi, stretches in n. lat. from 27° 40′ to 28° 30′, and in e. long. from 76° 21′ to 77° 35′, containing 2,016 sq.m., and (1868) 696,646 inhabitants. Its chief t., which bears the same name, stands at the height of 817 ft. above the sea. Its monthly temperature ranges between 66° F., the average of Dec., and 104°, the average of May.

GURGES, or GORGES, a charge in heraldry, meant to represent a whirlpool. It takes up the whole field, and when borne proper, is azure and argent.

GURGI'NA BALSAM, a name of the balsamic liquid, also called WOOD OIL, obtained from the gurjun tree (*dipterocarpus turbinatus*). DIPTERACEÆ and WOOD OIL.

GURHWA'L, a district in the n.w. provinces, lies between the Dehra-Doon and s.w. Thibet, extending in n. lat. from 30° 2′ to 31° 20′, and in e. long. from 77° 55′ to 79° 20′. It contains 5,500 sq.m., and (1871) 310,282 inhabitants. Being on the southern slope of the Himalaya, Gurhwal is little more than a mass of stupendous mountains, whose elevation above the sea sometimes reaches 23,000 feet. It may be regarded as the cradle of both the Jumna and the Ganges, attracting, in spite of the length and ruggedness of the way, crowds of pilgrims to the peculiarly sacred localities of Jumnotri, Devaprayaga, and Gangotri.

GURIEV, a t. and fortress in Russia on the Ural river, near its mouth, 188 m. n. of Astrakhan; pop. 2,838. The people are chiefly Cossacks, who have considerable business in manufactures and trade.

GURK'FELD, a t. of Carniola, Austrian empire, on the right bank of the Save, 46 m. e. by s. from Laibach, at the base of a mountain-range. It is supposed to occupy the site of the Roman Noviodunum. The district produces much wine. There are thermal springs and baths in the town. It contains a Capuchin monastery. Pop. '69, 6,000.

GURLEY, RALPH RANDOLPH, 1797–1872; b. Conn.; graduated at Yale, and became a preacher in Washington, under the Baltimore presbytery. He was for half a century agent for the American colonization society, visiting Africa three times in the interest of

the colored people, and aiding in establishing the republic of Liberia. He made a great number of addresses and wrote many reports on the subjects of emancipation and colonization.

GURMUKTESWAR', a t. of British India, in the district of Meerut, on the route from the town of Meerut to Moradabad, and 31 m. s.e. of the former. It is situated on the right bank of the Ganges, about 4 m. below the reunion of the Burha Ganga, or old course of the Ganges, with the present main channel, which, a mile and a half above the town, is crossed by a much-frequented ferry, on which 15 boats constantly ply. Gurmukteswar may be regarded as the port of Meerut and the adjoining district of the Doab. Pop. '71, 7,962.

GUR'NARD, *Trigla*, a genus of acanthopterous marine fishes of the family *sclerogenidæ*, containing a considerable number of species, some of which are common on the British coasts. The head in the gurnards is angular, and wholly covered with bony plates; the body is elongated, nearly round, and tapering; there are two dorsal fins; the pectoral fins are large; the teeth are small and numerous. Many of the gurnards are distinguished by beauty of color. They are supposed to have received the name of gurnard from the sound which they sometimes emit, particularly when newly taken out of the water, and which has obtained for one or two species the local name of *piper*. A recent observer, M. Dufossé, ascribes the sound to the vibration of muscles connected with the air-bladder, and has assigned to the notes produced by different species of gurnards their particular places in the musical scale. Most of the gurnards live generally near the bottom, and are caught either by the trawl-net or by hook and line, a shining piece of a sand-eel being a very captivating bait. Although not among the finest of fishes, they are good for the table. One of the most common British species is the RED GURNARD (*T. cuculus* or *T. pini*); seldom more than 15 or 16 in. long; of a rose-red color, the body marked on the upper part with fine transverse lateral ridges; another, larger and more valuable being sometimes 2 ft. long, is the SAPPHIRINE GURNARD (*T. hirundo*), remarkable for the large size of its pectorals and the blue of their inner surface; and perhaps the most common of all is the GRAY GURNARD (*T. gurnardus*), generally of a gray color, more or less clouded or spotted with brown, black, and yellowish-white. There are several other British species; those of the Mediterranean are more numerous. Gurnards are found also in the seas of the southern hemisphere.

GURNEY, ELIZABETH. See FRY, ELIZABETH, *ante*.

GURNEY, Sir GOLDSWORTHY, 1793–1875; b. England, and known as an inventor. Among his discoveries and improvements are the magnesium, lime, and Bude lights. He claimed to have invented the oxyhydrogen blow-pipe, and the earliest to produce those movements of the magnetic needle which led to the invention of the telegraph. He also first produced the high pressure steam jet.

GURNEY, JOSEPH, JOHN, a philanthropic Quaker, b. at Earlham Hall, near Norwich Aug. 2, 1788, was educated privately at Oxford, and in 1818 became a minister of the society of Friends. His life was devoted to the prosecution of benevolent enterprises. He died Jan. 4, 1847. Gurney wrote a great number of works; among others—*Notes on Prison Discipline* (Lond., 1819); *Observations on the Religious Peculiarities of the Society of Friends* (1824); *A Winter in the West Indies described in Familiar Letters to Henry Clay of Kentucky* (1840).

GUROWSKI, ADAM, Count de, 1805–66; b. Poland. He was expatriated in 1818, and again the next year for revolutionary actions, but returned in 1825, and had a share in the insurrection of 1830. When that was over he went to Paris, joined the Polish committee, and was busy in political excitements. In 1835 he published *La vérité sur la Russie*, a work advocating Panslavism which was so favorably thought of in Russia that he was recalled, though his confiscated estate was not restored. He was in the civil service of the empire, but left the country in consequence of a quarrel in 1844; passed some time in Switzerland, Germany, and Italy, and in 1849 came to the United States. He was for several years engaged in active literary work, and wrote occasionally for the *New York Tribune*. In 1861 he was employed in the state department at Washington. Besides his works written abroad he published in the United States, *Russia as it is; The Turkish Question; A Year of the War; America and Europe; Slavery in History*, and a diary of notes on the war of the rebellion.

GUSSET, a piece at first of chain, and afterwards of plate armor, intended as a protection to the vulnerable point where the defenses of the arm and breast left a gap.—In heraldry, the gusset is enumerated as one of the abatements or marks of disgrace for unknightly conduct. It is represented by a straight line extending diagonally from the dexter or sinister chief point one-third across the shield, and then descending perpendicularly to the base. Heralds tell us that a gusset dexter indicated adultery; a gusset sinister, drunkenness; and when both were borne it was because the bearer was faulty in both respects. Cowardice was indicated by an abatement called the gore sinister (see

GORE), which, though somewhat similar, we are told carefully to distinguish from the gusset, and which consists of two arched lines drawn, one from the sinister chief, the other from the middle base of the escutcheon, meeting in the fess point. A gore like a gusset represents a detached part of a garment; and according to Guillim, gores and gussets "are things in use among women, especially seamsters, and therefore are fit notes of cowards and womanish dispositions."

GUSTA'VIA, the chief t. of the French (till 1878, Swedish) island of St. Bartholomew in the West Indies, stands on its s.w. coast, has a good harbor, and has a population of about 1000.

GUSTAVUS I., king of Sweden—known in history as GUSTAVUS VASA, but designated before his accession to power, by himself and others, GUSTAVUS ERICSSON—was b. at Lindholm, in Sweden, on May 12, 1496, and d. in 1560. As the descendant of an ancient Swedish family, which had given members to the national diet for nearly 200 years, and which had been distinguished for hatred of and opposition to Danish supremacy, Gustavus was involved at an early age in the unfortunate quarrels and domestic wars which distracted Sweden at that period, and the first achievement of the future king was to take an active part in the defense made against Christian II. of Denmark, who, in 1517, in person commanded an assault upon Stockholm, the object of which was to compel the Swedish administrator, Svante Sture, and his senate to acknowlege him as king of Sweden. When famine compelled Christian to relinquish the siege, he had recourse to fraud; and having enticed a deputation from the senate, among whom was Gustavus, on board his ship, he set sail, and treacherously carried his captives to Denmark, where Gustavus spent a year in confinement in the custody of his maternal relative, Erich Baner, lord of Kalloe, in Jutland. While under confinement, Gustavus heard such alarming rumors of the expedition which the king was preparing against Sweden, that, irritated beyond endurance, he broke his parole, and escaped in the disguise of a pilgrim, or, according to others, as a drover, and after encountering numerous dangers, reached Lubeck (Sept., 1519), from which he was with difficulty conveyed to Sweden, where he landed, in May, 1520, near Calmar, the only place of note, except Stockholm, that still held out against the Danes. Gustavus with difficulty made his way into the castle of Calmar, which was defended by foreign mercenaries; but as his admonitions to the garrison to show more zeal in their defense were met by threats of delivering him to the Danes, he left Calmar, and took refuge among his father's peasantry in Smaaland. The Smaalanders had, however, already taken the oaths of allegiance to the envoys who had been sent through the country by Christian II. to ascertain the sentiments of the people, and Gustavus was soon compelled to retreat to Dalecarlia, where he wandered for several months, in poverty and disguise, with a price set on his head, and finally made his way, penniless and almost naked, to the house of his brother-in-law, Joachim Brahe, just as the latter was preparing to obey the summons of Christian II. to attend his coronation. Having failed to dissuade Brahe from attending this ceremony, which took place in Nov., 1520, Gustavus retired to his father's property of Räfsnäs, where he remained till he heard of the massacre known as the Blood-bath, which followed three days after the coronation, and in which, on the plea of their being the enemies of the true church, the greater number of the nobles and leaders of Sweden, including Brahe himself and Gustavus's father, Eric Johansson, were slaughtered in cold blood. Gustavus next retreated to the less frequented parts of Dalecarlia, where for a time he earned his living as a field-laborer, and more than once owed his life and safety to the generosity of the peasant-women of the district. This period of his life has been so long made the subject of traditionary lore and romance, that it is difficult now to separate the true from the false; but the fame of his supposed adventures still lives in the minds of the people of Sweden, who cherish as sacred every spot associated with his wanderings and dangers. His appeals to the Dalecarlians met with no success, until his account of the tyranny of the Danes was corroborated by the testimony of several fugitives from Stockholm, when a reaction followed, the national enthusiasm was roused, and the men of Dalecarlia, having called together a diet at Mora, proclaimed him head of their own and other communes of Sweden.

This was the turning-point in his life, for the peasantry now flocked around him from every side; and before another year had passed, many of the strongest posts of the enemy had fallen into his hands, and he was able to enter upon the siege of Stockholm, which terminated in 1523, when Christian II. was compelled by his enraged subjects to resign the crown, and retire from Denmark. His forcible abdication brought the Scandinavian union to a sudden close, after it had existed for a period of 126 years; for when Frederick I., the successor of Christian, demanded his recognition in Sweden, conformably to the union of Calmar, the Swedes declared at the diet of Strengnaes that they would have no other king but Gustavus Ericsson. But although Gustavus was at once recognized as king, he was not crowned till two years later, in consequence of his unwillingness to receive the crown from the hands of the Romish bishops. The king early showed his determination to favor the Lutheran doctrines, and to cripple the power of the Romish clergy, on whom he laid a large proportion

of the heavy imposts raised to meet the expenses of the war; and although his opinions were for a long time not favorably received by the people, he finally succeeded in establishing the reformation in Sweden.

The disaffection of the peasantry, who threatened to destroy the nobility, and the imprudence of the Lutheran clergy, who tried to force the people to adopt the reformed doctrines, combined to thwart many of Gustavus's schemes for the improvement of the country, while his latter years were disturbed and embittered by the jealousy and dissensions of his sons, Eric and John. Yet, notwithstanding these sources of disquietude, Gustavus effected more than any other Swedish monarch has ever done for the welfare of the people. He had found Sweden a wilderness, devoid of all cultivation, and a prey to the turbulence of the people and the rapacity of the nobles; and after forty years' rule, he left it a peaceful and civilized realm, with a full exchequer, and a well-organized army of 15,000 men, and a good fleet, which were both his creations. He promoted trade at home and abroad. Every profession and trade received his attention and fostering care, and schools and colleges owed their revival, after the decay of the older Roman Catholic institutions, to him. He made commercial treaties with foreign nations, and established fairs for foreign traders. In his reign, roads and bridges were made in every part of the country, and canals begun, one of which has only recently been brought to completion. In his relations with his subjects, Gustavus was firm, and sometimes severe, but seldom unjust, except in his dealings towards the Romish clergy, whom he despoiled with something like rapacity of all their lands and funds. He did much, however, to promote the cause of Lutheranism, although he took care that the reformed clergy should be dependent on the crown, and enjoy only very moderate emoluments. To him the various tribes of Lapps were indebted for the diffusion of Christianity among them by Lutheran missionaries; while the Finns owed to him the first works of instruction, Bibles, and hymn-books printed in their own language. Gustavus was methodical, just, moral, and abstemious in his mode of life; an able administrator; and, with the exception of a tendency to avarice, possessed few qualities that are unworthy of esteem. He was three times married, and had ten children. The name of Vasa, which has been supposed to be an ancient patronymic in his family, but erroneously, since surnames were not in use among the Swedish nobility until a later date, was adopted by him subsequently to his accession, and is conjectured by the historian Gejer (q. v.) and others to have been probably derived from his arms, which bore originally a black fascine used in storming, and afterwards drawn like a vase, but changed by Gustavus to yellow, from whence it came to be mistaken for a sheaf. By an act of the diet of 1544, at Westeraas, the crown was declared hereditary in the male descendants of Gustavus; in conformity with which, his eldest son Eric (q. v.) succeeded to the throne on his death in 1560.

GUSTAVUS II. (ADOLPHUS) was b. at Stockholm, Dec. 9, 1594, and d. in 1632 on the field of battle at Lützen. He was the grandson of Gustavus Vasa, by his youngest son, Charles IX., at whose death, in 1611, he succeeded to the throne of Sweden. Gustavus had been strictly brought up in the Lutheran faith, and carefully trained in habits of business, and was one of the most accomplished princes of his age. He was acquainted with eight languages, five of which he spoke and wrote fluently, was well read in the classics and ancient history; proficient in music, and excelled in all warlike and manly exercises. At his accession to power, he found the country involved in wars abroad, and disorders at home, arising from the disputed succession of his father, who had been elected king on the exclusion of his nephew, Sigismund, king of Poland, the direct heir, whose profession of the Roman Catholic religion made him obnoxious to the Swedish people, and virtually annulled his claims to the crown. The first act of Gustavus was to secure the hearty co-operation of the nobles, whose privileges he confirmed, and made dependent upon the performance of military service to the crown, and thus laid the foundation of an essentially feudal or military form of government, in which the nobles held their lands directly, and the peasantry indirectly, under the crown. In addition to these two bodies, which had formerly constituted the national diet, Gustavus for the first time admitted special delegates of the army into the assembly as assessors to the nobles. Having thus organized the internal government, and succeeded in levying heavy imposts and raising some companies of efficient troops, he inaugurated his military career by a war with Denmark, which at that time occupied the Baltic districts of the Swedish territories, and thus completely cut off the Swedes from direct communication with the continent of eastern Europe. The war continued for a year, and terminated in a peace between the two countries, by which Gustavus renounced his claims on the Lappish districts and other disputed territory, and recovered possession, under certain conditions, of Calmar, Oeland, Elfsborg, and the province of Gottenborg.

Having thus gained an outlet on the Baltic, secured a peaceful ally in the king of Denmark, and concluded an allegiance with the Netherlands, Gustavus turned his attention to the Russian war, which, after a fluctuating success, was concluded in 1617. by the treaty of Stolbova, by which Sweden obtained supreme dominion over Ingermanland and Karelia, and part of Lifland, while Russian recovered Novogorod and all

other conquests made by the Swedes. The boundary of the Swedish territory, which then included the site of the future St. Petersburg, was marked, after the peace, by a stone which bore the three crowns of Sweden above a Latin inscription, recording that it marked the limits of the dominions of Gustavus Adolphus, king of Sweden. The disputes with Poland still, however, remained undecided; and in 1621 war was openly declared between the two countries, and was continued, with occasional intermissions, till 1629, when it terminated in a six years' truce, which was settled by a treaty that secured reciprocity of trade and freedom of religion to the natives of both countries, and left Gustavus master of Elbing, Braunsberg, Pillau, and Memel.

This peace enabled the king to mature the plans he had long cherished in regard to Germany; and having made various administrative reforms, and availed himself of the short interval of peace to promote the material prosperity of the country, he remitted the charge of the government and the care of his infant daughter Christina to his chancellor Oxenstiern, and set sail, in the summer of 1630, with an army of about 15,000 men, to aid the Protestants of Germany in their hard struggle against the Catholic league, which was backed by the power of the empire.

Everything favored the success of the Swedes, who drove the imperialists from Pomerania, and took Stettin. The childless duke of Pomerania engaged, in return for Swedish aid, that the dukedom should, after his death, be given up to Sweden until the expenses of the war were fully repaid; whilst France, through hatred of the empire, agreed to furnish Gustavus with a subsidy of 400,000 rix-dollars as long as he maintained an army of 36,000 men. Wallenstein had also retired from the service of the emperor. But while the Swedes were besieging Spandau and Küstrin, the city of Magdeburg, which had applied to Gustavus for assistance, was taken in 1631 by the imperial general, Tilly, whose troops perpetrated the most terrible atrocities against the unfortunate inhabitants. Although Gustavus could not save Magdeburg, he soon after its fall inflicted a defeat on the imperialists at Breitenfeld, which excited the respect and fear of the Catholics, who thenceforward ceased to despise the "snow-king and his body-guard," as they designated Gustavus and his small army. The king now advanced into Franconia, and after allowing his army to recruit their strength in the rich bishoprics of Würzburg and Bamberg, took the Palatinate and Mainz, where he held a splendid court, surrounded by numerous princes and ambassadors. In the spring of 1632 the Swedes, in the face of Tilly's army, crossed the Danube, and gained a decisive victory at Ingolstadt, where Tilly was mortally wounded. From thence the march to Munich was one continued triumph, and wherever Gustavus appeared he was received by the populace as their guardian angel. The road to Vienna was now open to him, and the fate of the emperor would have been sealed, had the latter not recalled his general, Wallenstein, who, having accepted office on his own terms, gathered together a large army, with which he advanced on Nuremberg; but after standing a desperate assault of the Swedes, he was obliged to retire into Thuringia. The unfavorable season and the bad roads hindered Gustavus from attacking the imperialists at the time he intended, but on Nov. 6, 1632, the two armies came finally face to face at Lützen. As usual, the Swedes began by singing Luther's hymn, *Eine feste Burg ist unser Gott*, and a hymn composed by the king. Gustavus now made an address to the army, and swinging his sword above his head, he gave the word of command, and with the cry of "Onwards!" he rushed forward, followed by the eager troops, who were commanded conjointly by himself and Bernhard of Saxe-Weimar. Victory was already on the side of the Swedes, when a strong reinforcement of imperialists appeared under the command of Pappenheim. Gustavus seeing that his troops wavered under this fresh attack, rode hastily forward, when, having come too near a squadron of Croats, he received a shot in his arm, and, as he was turning aside, another in the back, which caused him to fall from his horse. The sight of the riderless animal spread dismay and fury among the Swedes; but before they could advance to his rescue, a party of Croats had thrown themselves between the king and his army; and it was not till after many hours' hard fighting, and when the field was strewn with 10,000 dead and wounded, that they recovered the body of the king, which had been plundered, stripped, and covered with wounds. The artillery of the enemy fell into the hands of the Swedes, who remained masters of the field, after having fought with an impetuosity that nothing could resist. A rumor long prevailed that the shot in the back which caused the king to fall was from the hand of Albert duke of Saxe-Lauenburg, but it appears that there was no just ground for the suspicion.

Although Gustavus was eminently a warlike king, he made many salutary changes in the internal administration of his country, and devoted his short intervals of peace to the promotion of commerce and manufactures. He was pre-eminently religious, and his success in battle is perhaps to be ascribed not only to a better mode of warfare, and the stricter discipline which he enforced, but also still more to the moral influence which his deep-seated piety and his personal character inspired among his soldiers. The spot where he fell on the field of Lützen was long marked by the *Schwedenstein*, or Swede's stone, erected by his servant, Jacob Erichsson, on the night after the battle. Its place has now been taken by a noble monument erected to his memory by the German people on the occasion of the second centenary of the battle held in 1832.

GUSTAVUS III.,-king of Sweden, was b. at Stockholm in 1746, and succeeded his father, Adolphus Frederick, in 1771, at a period when the country was distracted by the intrigues of the rival political parties of Horn and Gyllenborg, known as the "Hats" and "Caps." Finding that the people, who were thoroughly wearied by the misrule of the nobles, were ready for any change, Gustavus covertly fomented the general discontent, and having raised a fictitious rebellion, through the agency of his friend and adherent, capt. Hellichius, he collected together a large body of troops, on pretense, of restoring order, and having arrested the council in a body, convoked the diet, and laid before it a newly framed constitution, to which the assembly was compelled to subscribe. A revolution was thus effected without the shedding of blood, and by a stroke of the pen Gustavus recovered all the regal powers that had been gradually lost by his immediate predecessors. Gustavus acted with great moderation after this successful *coup d'état;* and he might have long retained the advantages he had gained, if his love of display, and his wish to emulate the king of France in extravagance and magnificence, had not led him into profuse expenditure, which embarrassed the finances; at the same time, the introduction of the manners and usages of Versailles at his own court irritated the national party, while it undoubtedly tended to demoralize the upper classes, and through them the nation generally. In 1788 he engaged in war with Russia, at the moment that the empire was engaged in active hostilities against the Turks, but derived no advantages from the contest. On the breaking out of the French revolution he combined with the other monarchs against France, and applied to the diet for funds to assist the Bourbons. His repeated applications having been decisively rejected, the nobles, amongst whom he had many enemies, took advantage of his general unpopularity, and entered into a conspiracy against him, the leaders of which were Ribbing, Horn, and Pechlin. On Mar. 16, 1792, Gustavus was mortally wounded by their agent, a capt. Ankarström (q.v.), at a masked ball in the opera-house which he had himself built. The pistol had been loaded with broken shot, which rendered the wound especially painful, and the king suffered the most dreadful agony for thirteen days before his death.

Gustavus was a man of varied learning, and the author of several dramatic works and poems of considerable merit. His writings have been published in a collective form both in Swedish and French. In 1788 Gustavus deposited certain papers in the library of Upsala, which excited much interest from the fact that they were not to be opened for fifty years after his death. Their publication, which was confided in 1842 to Gejer, disappointed the general expectation, as they were found to consist of historical notes and letters of little value.

GUSTAVUS IV., the son and successor of Gustavus III., was b. Nov. 1, 1778, proclaimed king Mar. 29, 1792, and died in 1837. His uncle, duke of Sudermania, acted as regent during his minority. The young king, on his accession to power, at once gave evidence of the high estimate at which he held the kingly power, and his first act was to join the third coalition against France, contrary to the wishes of his people. Hatred of Napoleon soon, however, became the guiding influence of his life. The result of his decided line of policy led to the occupation of Swedish Pomerania by French troops under marshal Brune, who took Stralsund and Riga from the Swedes in 1807, and thus deprived them of the last of their German possessions. The king opened all his ports to English vessels, and thereby involved himself in a war with Russia. The scene of these hostilities was Finland, which the Swedes were obliged to give up to Russia at the close of 1808. Norway became next the scene of war, the Swedes being assisted by an English subsidy of 10,000 men, who, however, speedily returned to England when they found that Gustavus intended to send them to Finland. The unfortunate war with Russia, which had been excited entirely through the folly of the king, gave rise to so much discontent in Sweden, that a conspiracy was set on foot by several officers and nobles, the object of which was to dethrone the unpopular monarch. The conspirators took forcible possession of the palace at Stockholm, and placed him under arrest; and after an ineffectual attempt at escape, he consented to abdicate the throne, Mar. 29, 1809. After wandering for a time from place to place, he finally settled at St. Gall, where he died, forgotten and in poverty, in 1837. His uncle, the duke of Sudermania, after acting as regent of the kingdom, was finally proclaimed king, under the title of Charles XIII., at the diet which met in May, 1809. By the consent of the diet, Charles XIV. (Bernadotte) paid over the value of the private estates of the family of Vasa for the benefit of Gustavus and his children; but as the dethroned king refused to receive any of this money directly, or to accept the pension which the Swedish government had settled upon him, he was often in pecuniary difficulties, from which he was clandestinely relieved by his divorced queen and children, who contrived, without his knowledge, to supply his wants.

GUSTAVUS ADOLPHUS SOCIETY, instituted among German Protestants in commemoration of the 200th anniversary of the death of Gustavus Adolphus, which occurred Nov. 16, 1632. Its object is to assist weak congregations of Protestant Christians in all parts of the world. It awakens much interest in Germany and has extended into the Netherlands and Sweden. Its annual income is $150,000, with which it aids more than 900 congregations.

GÜ'STROW, a t. of Mecklenburg-Schwerin, and long the residence of the princes, is situated on the left bank of the Nebel, 27 m. s. of Rostock. Among the principal buildings are the gymnasium, the old castle (now the workhouse), the fine Gothic cathedral, and the town-house. The former ramparts have been converted into pleasant gardens. Güstrow carries on distillation and beer-brewing, and has several water-mills. Pop. '75, 10,923.

GUTENBERG, JOHANNES, or HENNE, whose proper name was GENSFLEISCH, or GÄNSFLEISCH, and who is regarded by the Germans as the inventor of the art of employing movable types in printing, was b. near the close of the 14th c., at Mainz. He was sprung from a patrician family, which took the names of Gutenberg and Gensfleisch, from two estates in its possession. Of Gutenberg's early life no particulars are known, but it seems probable that he devoted himself at an early age to mechanical arts. In the year 1434 he was living in Strasburg, and there, in 1436, made a contract with Andrew Dryzehn, or Dritzehn, and others, by which he bound himself to instruct them in all his "secret and wonderful arts," and to employ these for their common advantage. This undertaking, which comprehended the first steps in the art of printing, was frustrated by the death of Dryzehn, more particularly as George Dryzehn, a brother of the deceased, commenced a lawsuit with Gutenberg, which was decided against the latter. When and where the first attempts in the art of printing were made, cannot with certainty be ascertained, as the works printed by Gutenberg bear neither name nor date; this much is, however, certain—namely, that movable wooden types were first employed by him about the year 1438. In 1443 he returned from Strasburg to Mainz, where, in 1449 or 1450, he entered into partnership with Johannes Faust, or Fust, a wealthy goldsmith. Faust furnished the money required to set up a printing-press, in which the Latin Bible was printed for the first time. This partnership was, however, dissolved after the lapse of a few years. Faust had made large advances, which Gutenberg was now to refund, but as he possessed neither the power nor the inclination, the matter was brought before a court of justice. The result was that Faust retained the printing concern, which he carried on and brought to perfection, in conjunction with Peter Schöffer of Gernsheim. By the assistance of Conrad Hummer, a councilor of Mainz, Gutenberg was again enabled to set up a press, from which, in all probability, proceeded *Hermanni de Saldis Speculum Sacerdotum*, printed in quarto without date or name. According to some, four editions of the *Donatus* were likewise printed by Gutenberg, while others ascribe them to Faust and Schöffer. In 1457 appeared the Latin *Psalterium*, or rather a breviary containing psalms, with antiphones, collects, etc., and arranged for choruses for Sundays and holidays. This specimen of the art of printing, remarkable as being the first bearing the name of the printer and the locality, as well as the year and day of its completion, and valued by Dibdin at £10,000, was printed with an elegance which sufficiently proves the rapid progress that had been made in the newly invented art, and the diligence with which it had been prosecuted. Gutenberg's printing establishment existed till 1465, in Mainz. He died, as is generally believed, Feb. 24, 1468, in which year the archbishop, elector of Mainz, appointed him one of his courtiers, and raised him to the rank of a noble, though others place his death at the close of the previous year. The evidence in favor of Gutenberg's being the inventor of printing, is considered by his countrymen quite conclusive. They adduce the testimony of Ulrich Zell of Hanau, who first introduced the art into Cologne (1462), and who declares that "this noble art was invented for the first time in Germany, at Mainz, upon the Rhine . . . . by a citizen of Mainz, named John Gutenberg." Similarly speaks Wimpfeling, a learned Alsacian (born at Strasburg, 1451, and partly contemporaneous with Gutenberg). "In the year 1440, under the reign of Frederick III., an almost divine benefit was conferred on mankind by John Gutenberg, who first discovered the art of printing." So, too, Trithemus (born 1462, died 1516). "At this epoch, this memorable art (viz., of printing) was devised and invented by Gutenberg, a citizen of Mainz;" while Johann Schöffer, son of Peter Schöffer (the partner of Faust), in his preface to a German translation of Livy (Mainz, 1505), expressly affirms that "at Mainz originally the admirable art of printing was invented particularly by the ingenious Johann Gutenberg, 1450 A.D.," and that it was "subsequently improved and propagated to posterity by the wealth and labors of Johann Fust and Peter Schöffer." That Gutenberg may have received the first hints of his invention from the Dutch xylography, is not denied. See COSTER. Ulrich Zell himself admits this; but the invention of typography, and beyond all doubt of the printing-press, must be ascribed to the German.—Compare Oberlin's *Essai d'Annales de la Vie de Gutenberg* (Strasburg, 1801); Née de la Rochelle's *Eloge Historique de J. Gutenberg* (Par. 1811); Gama's *Essai Historique de Gutenberg* (Par. 1857); and Lamartine's *Gutenberg, l'Inventeur de l'Imprimerie* (Par. 1853).

GUTHRIE, a co. in s.w. Iowa on branches of Raccoon river, and the Chicago, Rock Island and Pacific railroad; 576 sq.m.; pop. '80, 14,863. The surface is varied, and the soil fertile. Chief productions: wheat, corn, oats, and pork. Co. seat, Guthrie Center.

GUTHRIE, JAMES, LL.D., 1792–1869; b. Ky.; became prominent as a member of the bar; was several times elected to the legislature and presided over the state constitutional

convention in 1850. In 1853 he was secretary of the treasury in the Pierce administration, and in 1865 was chosen U.S. senator, but on account of ill-health did not take his seat.

GUTHRIE, THOMAS, D.D., an eminent pulpit orator, philanthropist, and social reformer, was b. in 1803, at Brechin, Forfarshire, where his father was a merchant and banker. He went through the curriculum of study prescribed by the church of Scotland to candidates for the ministry at the university of Edinburgh, and devoted two additional winters to the study of chemistry, natural history, and anatomy. Meanwhile, he was licensed as a preacher by the presbytery of Brechin, in 1825. He subsequently spent six months in Paris, studying comparative anatomy, chemistry, and natural philosophy. Returning to Scotland, he for two years conducted, on behalf of his family, the affairs of a bank agency in Brechin. In 1830 he became minister of Arbirlot, in his native county; and in 1837 was appointed one of the ministers of Old Greyfriars parish in Edinburgh. Here his eloquence, combined with devoted labors to reclaim the degraded population of one of the worst districts of the city, soon won for him a high place in public estimation. In 1843 Guthrie joined the Free church, and for a long series of years continued to minister to a large and influential congregation in Edinburgh. In 1845–46 he performed a great service to the Free church, in his advocacy throughout the country of its scheme for providing manses or residences for its ministers. Guthrie's zeal, however, was not diverted into mere denominational or sectarian channels. He came forward, in 1847, as the advocate of ragged schools (q.v.); and to him the rapid extension of the system over the kingdom is very much to be ascribed. He also earnestly exerted himself, in many ways, in opposition to intemperance and other prevailing vices. Guthrie possessed great rhetorical talent; and his style was remarkable for the abundance and variety of the illustrations he used. Few public speakers have ever blended solemnity and deep pathos so intimately with the humorous, his tendency to which has more frequently than anything else been pointed out as his fault. Guthrie always displayed a generous sympathy with all that tends to progress or improvement of any kind. He was moderator of the general assembly of the Free church of Scotland in May, 1862. Guthrie's most important published works are—*The Gospel in Ezekiel, a series of Discourses* (A. and C. Black, Edin. 1855); *The Way to Life*, a volume of sermons (Edin. 1862); *A Plea for Drunkards and against Drunkenness*, a pamphlet (Edin. 1856); *A Plea for Ragged Schools*, a pamphlet (Edin. 1847), followed by a second and a third plea, the latter under the title of *Seed-time and Harvest of Ragged Schools* (Edin. 1862); *The City: its Sins and Sorrows* (Edin. 1857). Perhaps his *Pleas* furnish the best published specimens of Dr. Guthrie's eloquence. For some years before his death he acted as editor of the *Sunday Magazine*, founded in 1864, in which year he retired from his regular ministrations. He died Feb. 24, 1873. His *Autobiography and Memoir* was published by his sons.

GUTHRIE, WILLIAM, a political, historical, and miscellaneous writer, was b. at Brechin, in Forfarshire, in 1708, and educated at King's college, Aberdeen. At an early period, he removed to London, where he worked hard for forty years as a man of letters. He died Mar., 1770. Among his various works are a *History of England* (3 vols. Lond. 1744–50); and *A Historical and Geographical Grammar* (1st edition, 1770; 24th edition, 1827); a useful manual of information, which enjoyed immense popularity in its time

GUT MANUFACTURE, an unpleasant though rather important branch of manufacture, the operations of which consist in preparing the membranes of animal intestines for various useful purposes. The French call it *boyawderie*, from *boyau*, intestine, and have placed it under stringent legal regulations, on account of its offensive and pestiferous character, especially when conducted in a populous quarter of a town, as at the Rue de la Boyawderie, in Paris. One branch of gut manufacture has been described under GOLDBEATERS' SKIN. *Cat-gut*, as it is called, is made from the intestines of sheep, which are first cleansed and freed from loose fat, then prepared by soaking and partial putrefaction, to loosen the different membranes of which the intestine is composed. These are then separated by scraping, then further soaked in clean water and scraped separately. After this, they are treated with a solution of potash, and drawn by women through a sort of thimble, and sorted for twisting into threads. They are then exposed to fumes of sulphurous acid, given off from burning sulphur, which deodorizes them, and prevents subsequent putrefaction. The small intestines are used for cat-gut, the large intestines are simply scraped and salted, for the use of sausage-makers and by confectioners, and for tying over preserve and pickle jars, etc. The coarser kinds of cat-gut strings are used for pulley and lathe bands, strings for archery-bows, drill-bows, hatters-bows, and other purposes where a strong cord subject to friction is required; the finer kinds are twisted into whip-cord, and are used for fishing-tackle and the strings of musical instruments. For the latter purpose a very superior quality is required. The best, called *Roman strings*, are made chiefly at Milan. Our manufacturers have never been able to equal these, and this is attributed by some to the fact that the Italian sheep are much leaner than ours, and the membranes of lean animals are tougher than those which are highly fattened and rapidly fed up to marketable size.

GUTS MUTHS, JOH. CHRISTOPH. FRIEDR., a German instructor of youth, was b. at Quedlinburg, in Prussian Saxony, Aug. 9, 1759, studied at Halle, and subsequently became attached to Salzmann's institution at Schnepfenthal. There he gave himself specially to the elaboration, theoretical and practical, of gymnastics (q.v.) as a branch of education; and from him it has passed into the curriculum of other German institutions. In 1793 Guts Muths published his *Gymnastik für die Jugend*, which has become a classic work on the subject, and the basis of all subsequent treatises. Besides several other works on his favorite subject, Guts Muths holds a distinguished place as a writer on geography. He died in 1839. His centennial anniversary was celebrated Aug. 9, 1859, at Schnepfenthal.

GUTTA-PERCHA (pronounced *pertsha*), a substance in many respects similar to caoutchouc, is the dried milky juice of a tree, *isonandra gutta*, which is found in the peninsula of Malacca and the Malayan archipelago. The tree belongs to the natural order *sapotaceæ*. It is a very large tree, the trunk being sometimes 3 ft. in diameter, although it is of little use as a timber tree, the wood being spongy. The leaves are alternate, on long stalks, obovate-oblong, entire, somewhat leathery, green above, and of a golden color beneath. The flowers are in little tufts in the axils of the leaves, small, each on a distinct stalk; the corolla having a short tube and 6 elliptical segments; they have 12 stamens and 1 pistil. The name gutta-percha is Malayan, *gutta* signifying the concrete juice of a plant, and *percha* being the name of the particular tree from which it is obtained. The present mode of obtaining the gutta-percha is a most destructive one. The finest trees are selected and cut down, and the bark stripped off; between the wood and bark, a milky juice is found; which is scraped up into little troughs made of plantain leaves. This is the gutta-percha, which, as it hardens, is kneaded into cakes, and exported.

Gutta-percha was known in Europe long before its peculiar character and uses were made known. It was from time to time brought home by voyagers, in the form of drinking-bowls, which excited much curiosity on account of the material of which they were made. Some thought it a species of india-rubber, others asserted it to be a kind of wood, which they named *mazer-wood*, from its use in making these drinking-cups. But we are chiefly indebted to Dr. William Montgomerie of the *Indian medical service*, whose introduction of it in 1843 was rewarded by the gold medal of the society of arts. He first noticed that the Malays used it for making handles to their knives, etc.; and it immediately occurred to him that it might be of great use in a variety of ways, especially in making handles for surgical instruments. Since that time, the importation of gutta-percha has increased amazingly; in 1860 it exceeded 16,000 cwts. The years 1864, 1865, 1870, and 1871 were marked by large imports, varying from 25,933 cwts. to 35,636 cwts.; in the years 1872 to 1876, the imports varied from 19,627 cwts. to 54,898 cwts. It has been used for making a vast variety of ornamental and useful articles; but its most important application has been the coating of marine electric telegraph wires. In this application, as in most others, its inherent defect, arising from the readiness with which it becomes oxidized and decomposed, is unfortunately manifesting itself seriously, and a substitute having greater stability is anxiously looked for.

Its great value arises from the ease with which it can be worked, and its being so complete a non-conductor of electricity. It softens in warm water, and can be molded into any form in that state; as when soft it is not sticky, and turns well out of molds. It will always be of great value as a material in which to take casts, as it can in the soft state be made to take the sharpest forms most faithfully, and as it quickly becomes hard, and preserves its shape if not too thin, the range of its utility in this respect is very extensive. Golf balls are made of gutta-percha.

It is imported in blocks and lumps of five to ten pounds weight, in various forms, chiefly like large cakes, or rounded into gourd-like lumps. It has a very light reddish-brown, or almost a flesh color, is full of irregular pores elongated in the direction in which the mass has been kneaded. It has a cork-like appearance when cut, and a peculiar cheese-like odor. Before it can be used, it has to undergo some preparation. This consists in slicing the lumps into thin shavings, which are placed in a *deviling* or tearing machine revolving in a trough of hot water. This reduces the shavings to exceedingly small pieces, which, by the agitation of the tearing-teeth, are washed free from many impurities, especially fragments of the bark of the tree, which, if not separated, would interfere with the compactness of its texture, which is one of its most important qualities. The small fragments, when sufficiently cleansed, are kneaded into masses which are rolled several times between heated cylinders, which press out any air or water, and render the mass uniform in texture. It is then rolled between heated steel rollers into sheets of various thickness for use, or is formed into rods, pipes for water, or speaking-tubes, and an endless number of other articles.

Gutta-percha differs very materially from caoutchouc or india-rubber in being non-elastic, or elastic only in a very small degree. Notwithstanding this very striking character of caoutchouc, the two articles are very often confounded in the public mind, probably from the similarity of their applications. It is most probable that india-rubber

will eventually displace gutta-percha in some of its most important applications, and especially in the coating of telegraph wires, to which purpose it has been successfully applied in America. There are two or three kinds of gutta-percha known in commerce, and it is more than probable these are yielded by different species: that from Singapore is esteemed the best, and is distinguished by the Malay traders as *gutta taban* or *tuban;* that of Borneo is of less value—this is called *gutta-percha* by the traders, and has given the general name to all; and another kind goes by the name or *gutta girek.* The first two are those generally known in our markets.

Gutta-percha is turned by surgeons to various uses, chiefly for splints and covering moist applications to retard evaporation. A splint of gutta-percha is made by taking a rigid board of the substance cut to the desired shape, soaking it in hot water, and then bandaging it to the limb. In a few minutes the gutta-percha is found hard, and modeled to the shape of the parts. The cloth of gutta-percha is sometimes used instead of oiled silk, as it is about half the price; it is, however, apt to tear, does not stand much heat, and is less flexible. Gutta-percha being readily soluble in chloroform, such a solution is sometimes used for covering raw surfaces, as when the chloroform evaporates it leaves a pellicle of solid gutta-percha. It has also been used for stopping hollow teeth.

GUTTA-PERCHA. See CAOUTCHOUC.

GUTTA RO'SEA, a kind of cutaneous eruption on the face, popularly called "brandy blossoms," from its frequent occurrence in dissipated persons advanced in life. It is an affection very difficult of cure, and to be treated chiefly by a careful regimen.

GUTTA SERE'NA, an old name for amaurosis (q.v.).

GUTTÆ, pendant ornaments attached to the underside of the mutules (q.v.), and under the triglyphs of the Doric order (see fig. under COLUMN). They are generally in the form of the frustrum of a cone, but are sometimes cylindrical. It is not clear what their origin may have been, whether, as the name indicates, they represent drops of water or icicles. Alberti calls them nails; and it does seem likely that as many other parts of Greek architecture have been shown to be derived from structural conditions (see ENTABLATURE), so these also should owe their origin to a similar cause. They have most probably been derived from the wooden pins or plugs, which were no doubt much more commonly used than iron nails, and of which it is still common to leave the ends projecting in any large wooden structure, such as the centering of a bridge. Whatever their origin, they were modified by the Greeks into a graceful ornament.

GUT'TÉ, or GUTTY, from the Latin *gutta,* a drop, is said in heraldry of a field, or any particular charge on the field, covered with drops. When the drops are red, they are supposed to represent drops of blood, and the bearing is said to be *gutté de sang.* In this case, some great suffering or labor, such as fighting for the recovery of the Holy Land, is indicated. Where they are blue, again, they represent tears, and the bearing is said to be *gutté de larmes.* When white, they are called drops of water, and the bearing is described as *gutté de l'eau;* but Nisbet is of opinion that tears are intended in this case also, and that repentance or penitence is signified by both.

GUTTER, an open channel for conveying water from buildings, roads, etc. Gutters are necessary for the preservation of such structures, and have thus been in use in all ages. The Greeks, who constructed their roofs with a simple span, used gutters at the eaves of their buildings, hollowed out of the stone which formed the cornice. These gutters discharged their contents on the ground at intervals through small gargoyles (q.v.), usually in the shape of lions' heads. The Romans followed this example, and also formed gutters with tiles laid in cement.

In the middle ages, the eaves seem to have been left without gutters, until, owing to the castles being frequently built on dry, rocky sites, it was found desirable to collect the rain-water and preserve it in cisterns. Stone or wooden eaves, gutters, and pipes were used for this purpose. In ecclesiastical architecture, when the construction became complicated, it was necessary to convey the water from the roofs with great care, so as to prevent damage to the building. It was collected at the eaves of the central roof, and by means of well-projected gargoyles, thrown along channels formed in the crest of the buttresses, and so carried beyond the walls of the building, and thrown off through gargoyles in a number of small streams, which dispersed the water before it reached the ground. This acted well in calm weather, but during storms the water was blown back all over the building, which, in case of its being of a porous stone, softened, and became liable to decay. This led to the use of lead pipes, which carried the water directly to the ground, and discharged it into open gutters. At first, the pipes were used for conveying the water from the main roof to the roof of the side-chapels, whence it was discharged by gargoyles. Pipes conveying the water to the base of the building were first employed in England, where they seem to have come into use during the 14th century. They were formed with great taste, and had ornamental cups or cisterns at top to receive the water from the mouth of the gargoyle. They were then, with considerable foresight, made *square* in form, not circular, as they usually now are. The advantage of the former section is, that in case the water in the pipe being frozen,

there is room for the expanding ice to swell out by slightly changing the form of the square.

Pipes for conducting rain-water have the great advantage of saving foot-passengers the annoyance they meet with from the discharge of the water from gargoyles; but the latter have the advantage of being more easily inspected and kept in good order. Whenever a gargoyle is choked, it shows the accident by its awkward spouting; but a lead pipe frequently bursts, and does much damage before the leak is discovered. See SEWAGE.

GUTTIFERÆ, or CLUSIA'CEÆ, a natural order of exogenous plants, consisting of trees and shrubs, natives of tropical countries, very generally secreting an acrid yellow resinous juice. A few are epiphytes. The leaves are opposite, destitute of stipules, leathery, and entire. In botanical characters, this order is allied to *hypericinæ*. It contains about 150 known species, the greater part of them South American, although all tropical countries produce some. The resinous secretions of some are valuable, particularly of those trees which yield gamboge (q.v.) and tacamahaca (q.v.). See also CLUSIA.—A few species afford valuable timber. See CALOPHYLLUM.—The flowers of some are very fragrant; those of *mesua ferrea* are found in a dried state in every bazaar in India, and are used as a perfume.—The fruit of some is very highly esteemed; the mangosteen (q.v.) has been described as the finest fruit in the world. The mammee apple (q.v.) is another of the most celebrated fruits of this order.

GUTZKOW, KARL FERDINAND; 1811–78; b. Germany. He studied theology and philosophy, and published in 1831 *Forum der Journaliteratur*. In 1833 he published a novel entitled *Maha Guru*, the story of a god. Having associated himself with the journalist, W. Menzel, at Stuttgart, the two authors produced *Novellen; Soireen;* and *Oeffentliche Charaktere*. He earned the reputation as the leader of "Young Germany" through his drama *Nero*, his preface to Schleiermacher's letters on Frederich von Schlegel, and his novel, *Wally, die Zweiflerin*, all of which were published in 1835. For the last named novel he suffered a three months' imprisonment at Manheim, the tendency of his writings being considered detrimental to religion and social order. In 1847 he became the successor of Tieck as dramatist at the theater of Dresden, and from 1852 he edited a weekly journal at Frankfort. In 1864 he attempted suicide while suffering from temporary insanity; and although after his recovery he continued to write as voluminously as formerly, his productions showed henceforth decided traces of failing powers. On account of a return of his nervous malady, Gutzkow, in 1873, made a journey to Italy, and on his return took up his residence near Heidelberg. Although some time before his death he had been confined to his sick chamber at Frankfort, its occurrence in 1878 was due to accidental suffocation from smoke. He has won a great reputation, and is considered by many the foremost German novelist of his time. Among his numerous works are *Zur Philosophie der Geschichte; Blasedow*, a satirical tale; *Zopf und Schwerdt*, and *Urbild des Tartufe*, two comedies; *Urul Acosta*, a tragedy; *Die Ritter vom Geiste; Der Zauberer von Rom; Fritz Ellrodt*, and many other novels.

GUTZLAFF, KARL, a missionary, was b. at Pyritz, in Pomerania, July 8, 1803. At an early age he was apprenticed to a belt-maker in Stettin. Here he composed a poem, in which he expressed his earnest wish to become a missionary to the heathen, and in 1821 presented it to the king of Prussia. The king caused him to be placed in the missionary institution at Berlin. At the expiration of two years, he was removed to the Dutch missionary society at Rotterdam, and in Aug., 1826, was sent to Sumatra. Being detained at Java, he fixed his residence at Batavia, where he devoted himself to the study of Chinese. At the end of two years, having acquired a considerable knowledge of the language, and familiarized himself with the habits of the Chinese residents in Batavia, he determined to give up his connection with the Dutch society, and devote himself to the conversion of the Chinese. He joined Tomlin, the English missionary, and, in the summer of 1828, accompanied him to Siam. They settled at Bankok, the capital, partly for the purpose of preaching the gospel, partly to render themselves thoroughly acquainted with the Siamese language, and to perfect themselves in Chinese. For the sake of his health, he now, by the advice of a Chinese friend, undertook a voyage to China; and from this time, Macao became his principal station, and here he formed an intimate friendship with Robert Morrison. In conjunction with Medhurst and two other friends, Gutzlaff began a new translation of the Bible into Chinese. With the assistance of Morrison, he founded a society for the diffusion of useful knowledge in China, published a Chinese monthly magazine, and preached at Macao and elsewhere. Compare his *Journal of Three Voyages Along the Coast of China in* 1831, 1832, *and* 1833, *with Notice of Siam, Corea, and the Loo-choo Islands*. After the death of the elder Morrison, Gutzlaff was appointed chief interpreter to the British supervisional government in China, with a salary of £800. In this capacity he attempted, in May, 1835, to penetrate into the interior of the province of Fo-kien, but without success. At the same time, the printing of Christian books in the Chinese language, and even the distribution of Christian writings among the inhabitants of Canton, were prohibited. Thus restricted in his missionary career, Gutzlaff joined the British during the war with the Chinese, and his thorough acquaintance with the Chinese rendered his services of great value. He likewise contributed to bring about the peace in 1842. Finally, in

1844, he founded a Chinese society for the purpose of diffusing the gospel, by means of native Christians, in the interior of the country. To promote the objects of the mission, he, in 1849, returned to Europe, and visited England, Germany, and other countries. He returned to China, landing at Hong-kong in Jan., 1851, but died there, Aug. 9, of the same year. Gutzlaff published various works, in different languages, some of which are extremely valuable; the principal are *Geschichte des Chines; Reichs* (Stuttg. 1847), and *The Life of Taokuang* (Lond. 1851).

GUY OF WARWICK, an old English metrical romance which is known to have existed in French as early as the end of the 13th century. Its authorship has been assigned to Walter of Exeter, a Franciscan monk, and, although this supposition has been generally disputed, Tanner regards it as probable. The romance has been retouched by some French or Anglo-Norman minstrels, but is evidently of Saxon origin, and is allied to the story of Guido Tyrius in the *Jesta Romanorum*, and probably to the romance of *Sir Guy* quoted by Chaucer in his *Rime of Sir Topas*. The hero of this story is sir Guy of Warwick, who is said to have been the son of Siward, baron of Wallingford, to have married Felicia, the only daughter of Rohand, a famous Saxon warrior, to have become earl of Warwick in his wife's right, and after conquering Colbrond the Dane, to have lived as a hermit till his death in 929. The earliest English chronicler who mentions the story as historical is John Harding. Tanner is of the opinion that the first germ of romance dates from the battle of Brunanburgh, the "Vinheide" of the *Egils saga;* but though the story has some basis in tradition, the chief events of the hero's life are plainly mythical.

GUY, THOMAS, founder of Guy's hospital, Southwark, London, was b. at Horsleydown in 1644. He began business as a bookseller with a stock of about £200, dealing extensively in the importation of English Bibles from Holland (those printed at home being executed very badly); and, on this being stopped, contracted with the university of Oxford for the privilege of printing Bibles, which he continued to do for many years. His principal gains, however, arose from the not very creditable practice of purchasing, during queen Anne's wars, the prize-tickets of seamen at a large discount, and subsequently investing them in South Sea company's stock, by which means he amassed a fortune of nearly half a million sterling. In 1707 he built and furnished three wards of St. Thomas's hospital. In building and endowing the hospital in Southwark, which bears his name, he set apart £238,295, 16*s*. He was also a liberal benefactor to the stationer's company, and built and endowed almshouses and a library at Tamworth. Besides making bequests to Christ's hospital, and various other charities, he left £80,000 to be divided among those who could prove any degree of relationship to him. He was of mean appearance, with a melancholy expression of countenance, and during his whole lifetime had no other reputation than that of an intensely selfish and avaricious man. He died Dec. 27, 1724, aged 80.

GUYON, JEANNE BOUVIER DE LA MOTHE, well known in connection with the Quietist controversy (see QUIETISM), was b. at Montargis, in France, April 13, 1648. She had destined herself for the cloister, but at the earnest solicitation of her family married, at the age of 14, M. Guyon, the son of a rich contractor of public works. Being left a widow at 25, and still retaining her early religious leanings, she transferred her three children to the care of guardians, settling on them almost all her property. Being thus entirely withdrawn from secular affairs, she attracted much notice by the high tone of spirituality which her conversation breathed, and was invited by M. d'Arenthon, bishop of Geneva, to settle in his diocese, where she formed the acquaintance of a Barnabite, Père Lacombe, then in much repute as a director of souls. The mystic doctrines which she learned from this ecclesiastic, and which involved such a degree of self-abnegation as to suppose that the truly Christian soul must become indifferent not only to life and death, but even to its own salvation or perdition, having come to the knowledge of the bishop, he withdrew his protection from Madame Guyon. In consequence she left Geneva, and accompanied by Père Lacombe, went to various cities of Italy and France, and eventually to Paris, where they drew about them a number of followers. The reputed extravagances of Madame Guyon led to her being shut up by a royal order in the convent of the Visitation, from which, however, she was set free, at the instance of Madame de Maintenon, and through this lady obtained entrance into the highest circles of Paris and Versailles. It was now that she formed the acquaintance of Fenelon, who was completely won by her evidently sincere piety, and captivated by the earnestness and lofty spirituality of her views. He failed to see the evil consequences which they involved; and the confiding zeal with which he defended her not only against the misrepresentations with which she was assailed, but even against the too well founded imputations which her principles had drawn upon her, was the cause of his unhappy rupture with Bossuet. See FENELON. Madame Guyon having submitted her writings to Bossuet and other members of a royal commission, subscribed 34 articles which were drawn up by them, and promised to abstain from all further speculation on these subjects. But she failed to keep her promise, and not only drew again upon herself the hostility of the court, but also became the object of much scandal on account of her intimacy with Père Lacombe. That the latter imputation was a calumny, it is impossible to doubt; but Madame Guyon was again put under arrest, and imprisoned first at

Vincennes and Vaugirard, and ultimately in the Bastile. She was liberated in 1702, and henceforward lived in comparative privacy till her death, which took place at Blois in 1717. She is the author of several works, the chief of which are *Torrents Spirituels*, *Moyen Court de Faire Oraison*, and *Le Cantique des Cantiques interpreté selon le sens mystique*, together with an autobiography and letters, as also some spiritual poetry.

GUYON, RICHARD DEBAUFRE, a gen. in the Hungarian army during 1848–1849, was b. at Wolcott, near Bath, in England, in 1813. After having fought against Dom Miguel in Portugal, Guyon entered the Austrian service in 1832; and on being attached as aid-de-camp to Baron Splényi, married the daughter of that general in 1838. From that time till the outbreak of the revolution, Guyon led the life of a country gentleman on his estates near Comorn, but was one among the first to offer his services to the national government, and acted a prominent part in the struggle for independence. During the retreat of Görgei's army, Guyon carried the mountain-pass of Branyiszko, and by that daring feat of his re-established the communication with the government of Debreczin, as also with the several other Hungarian army corps. When, in April, 1849, the garrison of the besieged fortress Comorn was to be apprised of the victorous approach of the national army, Guyon, with a detachment of hussars, cut his way through the enemy's lines, and announced the approaching relief. The bloody affair of Szöreg allowed Dembinski, protected by the self-sacrificing ten battalions of Guyon, to retire to Temesvár, where the last battle of the Hungarians was fought and lost on Aug. 9. Guyon escaped to Turkey, and entered the service of the sultan, without being obliged to turn Mohammedan. Under the name of Kourshid Pasha, he, as a general of division, was governor of Damascus, and at the beginning of the Crimean war, did much to organize the army of Kars. He died at Constantinople in 1856. Indomitable courage, and an incessant care for the comfort of the troops under his command, were the chief features in Guyon's character.

GUYOT, ARNOLD HENRY, PH.D., LL.D.; b. in Switzerland, 1807; educated at Neufchatel, Stuttgart, Carlsruhe, and the university of Berlin. At Carlsruhe was established the friendship with Agassiz, which influenced his whole subsequent career. He studied theology, but his natural taste and associations led him to devote himself to physical science. In 1835 he took the degree of PH.D. in the university of Berlin, and proceeded to Paris, where he spent five years in severe study, making scientific tours during the summers in France, Belgium, Holland, and Italy. His investigations at this time and subsequently, in relation to glaciers, were of great interest and importance. From 1839 to 1848 he was professor of history and physical geography in the academy or university of Neufchatel. In 1848 a political revolution broke up the academy, and Agassiz, who had already emigrated to the United States, induced Guyot to follow him thither. He resided for several years at Cambridge, Massachusetts. In the winter of 1848–9 he delivered a course of lectures in French, on *The Relations between Physical Geography and History*, at Boston, which was translated by prof. Felton, and published under the title of *The Earth and Man*. He was next employed by the Massachusetts board of education to instruct the teachers in normal schools and teachers' institute in the best method of teaching geography; and subsequently by the Smithsonian institution to investigate the physical structure and elevation of the Alleghany system of mountains. In 1855 he was appointed professor of physical geography in the college of New Jersey. Besides delivering courses of scientific lectures, and contributing to periodicals, he has published a series of geographical works, including *Primary Geography*, *Intermediate Geography*, and *Physical Geography*, with a set of large wall maps. With president Barnard of Columbia college, he edited Johnson's *Universal Cyclopædia*. Guyot was the first to show the precise height of Mt. Washington, of the Green mountains, and of the Black mountains in North Carolina. Among his works are *Cosmogony of the Bible*, *The Unity of the System of Life*, *the true Foundation of the Classification of Plants and Animals*, and *Man Primeval*, all in the form of lectures, but subsequently published.

GUYSBOROUGH, a co. in n.e. Nova Scotia bordering on the Atlantic; 1656 sq.m.; pop. '71, 16,555. The sea-coast is rough and barren, but there is some tillable land in the interior. Gold mining has been followed with some success, but the extensive fisheries are the main source of prosperity. The chief town has the same name.

GUY'S HOSPITAL, founded by Thomas Guy, who leased from the governors of St. Thomas's hospital, a large piece of ground, for a term of 999 years, at a groundrent of £30 a year. The space being cleared, the first stone of the building was laid in 1722, and the hospital admitted its first patient in 1725, a few days after the death of its founder. The whole expense was £18,796, 16*s*., great part of which Guy expended in his lifetime, and he bequeathed £219,499 to endow it. Soon after his death, an act of parliament was obtained, regulating the management of the institution. In 1829 Mr. Hunt bequeathed to the hospital £190,000, and additional bequests to the amount of £10,000 have since been received. There was at first room for about 400 patients; now 700 can be accommodated. The yearly average of patients is over 3,000; the out-patients relieved may amount to 50,000. The annual income is about £40,000, chiefly from estates in the counties of Essex, Hereford, and Lincoln. The usual number of governors is 60, who are self-elective. Students enter the hospital for study, attending chemical practice, lectures, etc., and paying annual fees. The building consists of

two quadrangles, united by a cross structure or arcade, besides two wings extending from the front to the street—west wing built with elegance and uniformity, and whole edifice handsome and regular. A library and valuable museums are attached to the hospital. New wards, with tall towers for ventilation, were built in 1852, and a chemical laboratory in 1872. In the chapel is a fine marble statue of Guy, by Bacon, which cost £1,000. Sir Astley Cooper, the eminent surgeon, is buried in the chapel.

GUYTON DE MORVEAU, Louis Bernard, 1737–1816; b. France. When a youth he was made deputy attorney-general in the parliament of his native city (Dijon), but his inclination was to science, and he soon mastered enough of chemistry to take a professorship. In 1773 he made known the value of chlorine as a disinfectant. In 1782 he proposed a new chemical nomenclature which met the approval of Lavoisier and other learned scientists, and with their assistance brought it to the form which it still retains. For the *Encyclopedie Methodique* Guyton wrote a *Dictionary of Chemistry*. He was a member of the legislative assembly, and of the convention, where he voted for the execution of Louis XVI. From 1800 to 1814 he was at the head of the French mint, where he did much to promote the use of the decimal system.

GUZEL-HISSAR. See Aidhn.

GUZERÁT, a British district in the Punjab, India, 2,029 sq.m.; pop. '68, 616,347. It comprises a narrow wedge of sub-Himalayan plain country, possessing few natural advantages. From the basin of the Chenáb on the s., the general level rises rapidly towards the interior, which, owing to the distance of water beneath the surface, assumes a dreary and desert aspect. A range of low hills, known as the Pabbi, traverses the northern angle of Guzerát. They are composed of a friable tertiary sandstone and conglomerate totally destitute of vegetation, and presenting to the view a mere barren chaos of naked rock, deeply scored with precipitous ravines. Immediately below the Pabbi stretches a high plateau, terminating abruptly in precipitous bluff some 200 ft. in height. At the foot of this plateau is a plain, which forms the actual valley of Chenáb, and participates in the irrigation from the river bed. The district, as a whole, is well wooded, and great attention has been paid to arboriculture. Numerous relics of antiquity stud the surface of Guzerát district. Mounds of ancient construction yield numbers of early coins, and bricks are found whose size and type prove them to belong to the prehistoric period of Hindu architecture. A mound now occupied by the village of Moga or Mong has been identified as the site of Nicæa, the city built by Alexander the great on the field of his victory over Porus. The Delhi empire established its authority in this district under Bahloh Lodi, 1450–88. A century later it was visited by Akbar, who founded Guzerát as the seat of government. During the decay of the Mughal power, the Ghakkars of Rawal Pindi overran this portion of the Punjab, and established themselves in Guzerát about 1741. Meanwhile the Sikh power had been asserting itself in the eastern Punjab, and in 1765 the Ghakkar chief was defeated by Sardar Gújar Sinh, chief of the Bhangi confederacy. On his death his son succeeded him, but after a few months' warfare, in 1798 he submitted himself as vassal to the maháráját Ranjít Sinh. In 1864 Guzerát first came under the supervision of British officials. Two years later the district became the theater for the important engagements which decided the events of the second Sikh war. After several bloody battles in which the British were unsuccessful, the Sikh power was irretrievably broken at the engagement which took place at Guzerát on Feb. 22, 1849. The Punjab lay at the feet of the conquerors, and passed by annexation under British rule.

GU'ZERAT, or Gujerat, a geographical division of India, stretches in n. lat. from 20° to 24° 45′, and in e. long. from 69° to 74° 20′, containing about 42,000 sq.m. and about 3,000,000 inhabitants. Its most important section, perhaps, is the peninsula of Kattywar, which projects into the Arabian sea between the gulf of Cutch on the n.w. and the gulf of Cambay on the south-east. Of the mainland, a considerable portion is shut out from the sea by the British districts of Broach and Surat, so that the peninsula comprises nearly the whole of the coast-line and most of the available harbors. With regard, however, to internal communications, the mainland has the advantage of the peninsula, being traversed, to say nothing of streams of inferior magnitude, by the Nerbudda and the Tapti. To the s. of the last-mentioned river, Guzerat presents the northern extremity of the Western Ghauts. The products are rice, wheat, barley, sugar, tobacco, castor-oil, maize, opium, cotton, and fruits. Within the limits of Guzerat (also spelled *Gujarat* or *Gujerat*) lie the Guicowar's territory, and the numerous petty states of Kattywar, Mahi Kanta, and Rewa Kanta. The name Guzerat often includes also the British administrative division under the governor of Bombay, which comprises the districts of Surat, Broach, Kaira, Punch Mehals, and Ahmedabad.

GUZERAT', or Gujaret, a walled t. of the Punjab, stands on the right side of the Chenab, and is a place of some military and political importance, being on the great route between Attock and Lahore. Here, in 1849, a Sikh army of 60,000 men was utterly defeated by a much less numerous British force. Pop. '68, 15,907.—For the territory called Guzerat, see under that heading.

GWALIOR, the state above mentioned, with a remarkably irregular outline, and an area of only 33,119 sq.m., stretches in n. lat. from 21° 8′ to 26° 50′, and in e. long. from 74° 45′ to 79° 21′. Lying partly in the basin of the Jumna and partly in the basins of the Nerbudda and the Tapti, it divides its drainage between the bay of Bengal and the Arabian sea. It has been roughly estimated to contain about 3¼ millions of inhabitants. Though Gwalior is a Mahratta principality, being in fact, the principal fragment of the great empire of the Peishwa, yet it is only to the s. of the Nerbudda that the Mahrattas form any considerable proportion of the people. Under such circumstances, therefore, the dominant race can maintain its supremacy by force alone. Since 1803, the country has been under British protection. The existing relations of the two parties, however, date only from 1844. In 1843 the death of the sovereign, by producing universal anarchy, led to the forcible interposition of the British government; and by the treaty of the following Jan., in addition to a large contingent under British authority, the native government was permitted to have 9,000 troops of its own. During the troubles of 1857, the new Maharajah, not more than 22 years old, remained faithful to the English, notwithstanding the almost entire defection of both divisions of the military force.

GWA'LIOR, the capital of the state of the same name in central India, stands near the n.e. extremity of its straggling territory, and has a pop. of about 50,000. Its nucleus is an isolated rock of about 300 ft. in height, perpendicular, either naturally or artificially, on all sides; and as it measures 1½ m. by 300 yds., it can accommodate a garrison of 15,000 men. It is thus virtually impregnable against any native force. The spot is understood to have been occupied as a stronghold for more than a thousand years, and the summit has been provided, from time to time, with several spacious tanks. Along the eastern base of this eminence lies the town of Gwalior, containing little worthy of notice but a beautiful mausoleum of white sandstone; and to the s.w. there extends for several miles the Lashkar, or camp of the Maharajah's own army, while to the n.e. is the Moorar, or cantonment of the protecting contingent. During the troubles of 1857 and 1858, the place attained an unenviable notoriety as a center of rebellion, having, notwithstanding the fidelity of the Maharajah himself, been, for rather more than a year, in the power of the insurgents.

GWIN, William McKendry, b. Tenn. 1805; educated at Transylvania university, and practiced medicine in Mississippi. He was a member of congress in 1841. In 1848 he went with the gold-hunters to California, and in 1850 came back as U. S. senator. Early in the war of the rebellion his disloyalty was so conspicuous that he was sent to prison. After the war he lived for a time in northern Mexico.

GWINNETT, a co. in n. Georgia, on the Chattahoochee river, intersected by the Atlantic and Richmond air line railroad; 520 sq.m.; pop. '70, 12,431—2,159 colored. The surface is rough and mostly covered with forests. Much of the soil is fertile, producing cotton, corn, wheat, etc. There are also mines of gold, antimony, and iron. Co. seat, Lawrenceville.

GWINNETT, Button, 1732–77; b. England, and came to America in 1770. He became an extensive planter in Georgia, and was an early supporter of colonial rights. He was a member of congress, and president of the Georgia provincial council. In consequence of a quarrel about military matters he had a duel with gen. McIntosh, in which he was mortally wounded. Gwinnett was one of the signers of the declaration of independence.

GWY'NIAD, *Coregonus pennanti,* one of the British species of *coregonus* (q.v.) which, from their form, the large size of their scales, and their silvery appearance, are sometimes called *freshwater herring,* and are vulgarly identified with the herring. The general similarity is in this case very great. The gwyniad, when full grown, is about 10 or 12 in. in length; the first dorsal fin is high; the snout is a little produced; the mouth is small, the jaws without teeth, a few minute teeth on the tongue only. It is found in some of the lakes of Wales and Cumberland. Gwyniad is a Welsh name. At Ullswater, the fish is called *schelly.* It occurs in that lake in great shoals, so that many hundreds are sometimes taken at a single draught of the net. It is rather an insipid fish, and cannot be kept long after being taken out of the water, unless salted, which it often is by the poor. The freshwater herring of Loch Lomond is not the gwyniad, but the powan. Many of the species of this genus, however, very nearly resemble each other, and are not easily distinguished by mere description.

GWYNN, or GWINN, Eleanor, or Nell, 1650–90; a girl born in poverty, who sold fruit and flowers, and sang songs around the taverns and playhouses of London. About 1666 she went on the stage, and in light and humorous plays became one of the most successful actresses of the time. Having been mistress to Lord Buckhurst, she passed from him to Charles II., who had no scruple about acknowledging her, and she remained with him as long as he lived, keeping an establishment of her own, and having free admission to the best society. She was the only one of the king's favorites who remained true to him. A son of her's by the king became duke of St. Albans. After Charles's death she led a quiet and respectable life.

GYARMAT'-BALAS'SA, or BALASSA-GYARMAT, a t. of Hungary, in the co. of Neograd, 42 m. n. by e. from Pesth, on the left bank of the Eipel or Ipoly. The surrounding district is very beautiful and fertile, producing much excellent wheat. Near the town are the ruins of a castle, once belonging to the Balassa family, and famous as having been oftener than once heroically defended against the Turks. Pop. '69, 6,435.

GYAROS, one of the Cyclades islands of the Grecian archipelago, 10 m. n.w. of Syra. It is about 5 by 3 m., and mountainous. It was once the residence of persons banished from Rome.

GYBING, or JIBING, in sailing with fore-and-aft sails, the act of shifting over the boom, when the wind is astern or at any point abaft the beam, so that the wind may be brought to bear on the sail on the reverse side of the vessel to that in which it was felt previously to the operation. With a change of wind or course, the boom and its sail are *gybed* to the other side of the vessel.

GY'GES, a Lydian, about whose early life little is known. Nyssia, wife of Candaules, king of Lydia, having been grievously affronted by her husband in presence of Gyges, ordered the latter, who was in high favor with his sovereign, either to slay Candaules or to prepare for his own fate. (Compare the history of Rosamund, wife of Alboin, king of the Lombards; Gibbon, vol. v. p. 339, Murray's ed.) Gyges accordingly put his master to death, married Nyssia, and assumed the supreme power, about 716 B.C. The Lydians, however, refused to acknowledge his authority, until the oracle of Delphi declared in his favor. In return for this service, he made immense presents to the sacred shrine. He is said to have reigned 38 years, and to have amassed enormous wealth, so as to give origin to the proverb, "the riches of Gyges." The successors of Gyges were Ardys, Sadyattes, Alyattes, and Crœsus, who was defeated by Cyrus the great in 546 B.C. (or 548). The Lydian empire was thus overthrown. Plato has a fable, in which Gyges is represented as a shepherd of Candaules; but having miraculously obtained possession of a golden ring of great virtue, he was enabled by means of it to make himself invisible when he chose, and thus took occasion to murder his sovereign, and usurp the supreme power. The ring of Gyges is frequently mentioned in the middle ages.—GYGES is also the name of the hundred-handed giant, son of Cœlus and Terra, who with his brothers made war on the gods, and after his overthrow, was subjected to everlasting punishment in Tartarus.

GYLLEMBOURG-EHRENSVÄRD, THOMASINE KRISTINE, baroness, 1773–1856, the most eminent female writer of Denmark. Her great beauty early attracted notice, and before she was seventeen she married the political writer Peter Andreas Heiberg. To him she bore a son, afterwards illustrious as a poet and critic, Johan Ludvig Heiberg. In 1800 her husband was exiled and she obtained a divorce, marrying, in 1801, the Swedish baron Ehrensvard, himself a political fugitive. Her second husband, who presently adopted the name of Gyllembourg, died in 1815. In 1822 she followed her son to Kiel, where he was appointed professor, and in 1825 she returned with him to Copenhagen. In 1827 she first appeared as an author by publishing her romance of *The Polonius Family* in her son's newspaper, *The Flying Post*. In 1828 the same journal contained *The Magic Ring*, which was immediately followed by *An Everyday Story*. The success of this anonymous work was so great that the author adopted until the end of her career the name of *The Author of an Everyday Story*. From this time forward she took a foremost place among the writers of her time, but preserved her incognito with entire success. In 1833–34 she published three volumes of *Old and New Novels*. *New Stories* followed in 1835 and 1836. In 1839 appeared two novels, *Montanus the Younger* and *Ricida;* in 1840 *One in All;* in 1841 *Near and Far;* in 1843 *A Correspondence;* in 1844 *The Cross Ways;* in 1845 *Two Generations*. From 1849 to 1851 the baroness was engaged in bringing out a library edition of her collected works in 12 volumes. She died in her son's house at Copenhagen, and not until then did the secret of her authorship transpire; for throughout her life she had preserved the closest reticence on the subject, even with her nearest friends. The style of Mme. Ehrensvard-Gyllembourg is clear and sparking; for English readers no closer analogy can be found than between her and Mrs. Gaskell, and *Cranford* might well have been written by the witty Danish author. She introduced into the literature of her country a novel vein of realism and domestic humor, and, although she has had many imitators, she is still without a rival.

GYMNA'SIUM. This word (from *gymnos*, naked) was applied to those public places or buildings where the Greek youths exercised themselves. In Athens alone there were seven resorts of this kind. Philosophers also gave instruction in these *gymnasia*, hence the transference of the name to public buildings erected for the mental disciplining and instruction of youth. The German gymnasium corresponds roughly to the grammar and public schools of England, and the grammar and high schools of Scotland. All three had their origin in the cathedral and monastery schools of the pre-reformation period. The widening circle of human knowledge in the 17th and 18th centuries made itself felt in these educational seminaries, as in the universities. Their curriculum became gradually extended, and with the further increase and development of univer-

sities, their aims became higher. In Germany, as in this country, the classical tongues formed and continue to form the great instrument of mental discipline in schools of this higher class, though other subjects have been added from time to time. The subjects of instruction which were first added to the classical tongues were geography and history. The natural sciences and mathematics, the pursuit of which has formed a characteristic feature of this century, gradually found a place in the schoolroom ; and the study of the mother-tongue and of modern languages was also admitted. For a time, these subjects held a co-ordinate place with Latin and Greek. Departmental studies were taught with ardor, and educators were sanguine of the results which would flow from early initiation into the results and processes of the various sciences. These anticipations having been somewhat disappointed, there has for some time been a steady movement towards the restoration of classical or humanistic studies to be the main instrument of education, while retaining other subjects as a subordinate portion of the curriculum. The idea, however, of the gymnasium as specially a preparatory school for the university, and therefore not suited to all classes indiscriminately, has been more steadily kept in view in Germany than in Great Britain, and the consequence has been the breaking up of the middle school or gymnasium into two—the gymnasium proper, where those are taught who propose to enter the universities, or who desire a partial classical training ; and real-schools where elementary science, foreign languages, and mathematics form the principal subjects of instruction. In this respect, the middle-school education of Germany affords a favorable contrast to that of England. It is not to be supposed, however, that in England the grammar and public schools are less efficient in their classical training ; the contrary is probably the fact, so far as our principal schools, such as Eton, Harrow, and Rugby, are concerned ; but the methodized system of examinations, and the more rigorous methods of Germany, seem to turn out a larger *proporiton* of well-instructed boys from each school, while the influence of central authority secures greater uniformity of processes and results throughout the country. The boys attend, as in England, till they reach the age of 18, when, after a special examination (the abiturient or maturity examination), they are transferred to the university. The German gymnasiums differ from English public schools for the middle and higher classes in being day-schools, and not the center of great boarding establishments. In this respect they resemble the Scotch grammar and high schools.

GYMNAS'TICS (see GYMNASIUM), a term, in its more restricted and proper sense, applied to those exercises, not amounting in intricacy to games, by which particular limbs, either singly or in combination, are rendered more pliant or stronger ; these exercises are arranged in a due progression, and the entire series becomes a system under the name gymnastics. Swimming (q.v.), boating, and games like golf (q.v.), cricket (q.v.), etc., are among the most efficient gymnastic exercises ; but in this article attention will be confined to exercises whose primary and direct aim is muscular development and health.

Gymnastic games are so old as to be pre-historic ; they are alluded to in the 2d and 23d books of the *Iliad*. Before the time of Hippocrates, gymnastic exercises had been adopted in Greece as part of the course of medicine intended to counteract increasing luxury and indolence. The various exercises were speedily combined into a system, and gymnasia, where they should be carried out, were formed first by the Lacedæmonians, and subsequently at Athens. See GYMNASIUM. The Romans adopted the system, and constructed gymnasia on a magnificent scale. Many of their buildings, having had extensive baths attached, were known as *Thermæ*. The exercises in the gymnasia consisted of running, leaping, dancing, wrestling, boxing, hurling, etc. ; and in those days, when all men bore arms, and when, in close combat, victory went generally with the strongest man, these games were doubtless of great value. In subsequent ages of knightly prowess, similar exercises were probably practiced, though less publicly ; but with the introduction of gunpowder, and through its means, the gradual substitution of fighting at a distance—in which science and skill were the main requisites—for personal encounters where strength and muscle went far to carry the day, the attention paid to gymnastics decreased, and finally vanished altogether. To make infantry soldiers perfect in the drilled movements of masses, cavalry good horsemen and fair swordsmen, and to have gunners who could take an accurate aim, became the utmost sought by the possessors of great armies ; while the science of gymnastics, having gone out of repute for the military, was speedily neglected in merely civil life. It is only from the earlier portion of the present century that the science has at all revived.

The revival commenced in Prussia, where, about 1806, gymnasia were opened by Basedow and Salzmann, that of the latter being under the superintendence of the celebrated gymnastic pedagogue Guts Muths (q.v.); Jahn followed in the same line, and rendered the science so popular that it speedily attracted the attention of the youth throughout the kingdom, and to the training thus obtained must be attributed, in no small degree, the vigor which succeeded in driving out the French army of the first empire. Sweden soon imitated Prussia, and from that time gymnastics have formed a prominent feature in the Scandinavian course of education. In Prussia, the gymnasia began to be the scenes of political gatherings, too liberal in tendency to please its semi-

military government; and in 1818 they were all closed. The troops were, however, continued in gymnastic exercises, and showed so clearly the advantages of the training experienced, that, about 1844, Louis Philippe adopted and improved the system in the French army. From that time, gymnasia have been constructed for almost all continental armies, and, with more or less success, for the civil population. England, last ordinarily in public improvements, only moved in the matter a few years ago by establishing instruction in the science at Aldershot and other camps; in private life, however, there have long been many excellent gymnasia.

Different instructors adopt various systems of instruction. The course passed through in the French army is, however, one among the best, as its fruits evince, in the remarkable activity and readiness for emergency displayed by the soldiers who have undergone it. The equipment consists of a broad belt, to be strapped tightly round the waist above the hips, as a support to the body in the arduous motions to ensue, braces being of course discarded. The implements most commonly required are an iron ball in a rope-sling, with a loop for the hand to pass through; wrestling-handles, consisting of two wooden bars, each about 18 in. long, connected by stout cordage; a club; leaping bars, to be leaped over; and leaping-poles wherewith to leap.

The system of instruction is divided into a number of "courses" regularly graduated, beginning with elementary and special movements, with a view to render every part of the body supple, and to develop the several muscles and give complete command over all their motions (*elementary gymnastics*); and proceeding to exercises of leaping, suspension, standing and walking on beams, walking on stilts, climbing, swinging, vaulting, etc. (*applied gymnastics*).

The theory of the advantage derivable from gymnastics is simple enough. An admirable law of nature provides that—within certain limits—parts of the human frame increase in strength, aptitude, and size, in proportion to the use made of them. In gymnastics, this law is brought to bear successively on every part, and finally on the whole system in combined action. If the exertion be not carried so far as to induce excessive fatigue, all other parts of the body sympathize with the improving condition of that which is mainly exerted; the circulation, excited from time to time by the exercise, acquires fresh vigor, and blood being driven with unwonted force into all parts of the system, every function is carried on with increased activity; an improvement in the general health becomes soon manifest, and the mind—if simultaneously cultivated with judgment—increases in power and endurance.

Gymnastic exercises require, however, to be practiced with many precautions, and always with moderation and due regard to the strength of the individual. The whole benefit may be counteracted by excess; the muscles may be overstrained, and ruptures and other serious accidents ensue. The danger of such evils from gymnastic exercises has perhaps been exaggerated, and it has no doubt hindered their more extensive introduction into schools. But it is to be remembered that hardihood can in no way be obtained without risk; for cricket, fencing, boating, and other manly sports, are attended with at least as much danger as a well-regulated course of gymnastics.

A short account of gymnastics and out-of-door recreations is given in *Chambers's Information for the People*, vol. ii. Other works on the subject are—Capt. Chiasso's *Gymnastics and Calisthenics;* G. Roland's *Gymnastics;* Walker's *British Manly Exercises;* and MacLaren's *Training, in Theory and Practice;* and *Physical Education, Theoretical and Practical* (1868). The books written in German on Gymnastics (Turnkunst) would form a small library.

GYMNE'MA. See COW PLANT.

GYMNE'TRUS, a genus of acanthopterous fishes of the ribbon-fish (q.v.) family, having the body much elongated, and at the same time attenuated and compressed, the dorsal fin extending the whole length of the back, the ventral fins consisting only of a single long ray, often dilated at the end; the mouth small. The fishes of this genus are inhabitants of great depths, and are rarely taken or thrown ashore. *G. remiceps* is a native of northern seas; *G. hawkenii* has occurred on the coast of Britain; other species are tropical. It has been supposed that large fishes of this genus may have given rise to some of the stories of the great sea serpent. One was lately captured at the Bermudas, apparently an immature fish, but more than 16 ft. in length, and with a row of long flexile filaments on the back of the head and anterior part of the back, which might well represent the mane often ascribed to the sea serpent. A specimen of *G. hawkenii*, caught on the coast of Northumberland, was exhibited in London at the time when the subject of the great sea serpent excited greatest interest, and was by many supposed to explain the accounts of it.

GYMNO'CLADUS, a genus of trees of the natural order *leguminosæ*, sub-order *cæsalpiniæ*.—Gymnocladus *Canadensis* is a North American tree, found both in Canada and over a great part of the United States, attaining a height of 50 to 60 ft., with branches remarkable for their upright direction, and an exceedingly rough bark which comes off in slips. The leaves of young trees are very large, 3 ft. long, bipinnate. The flowers are white in short spikes. The pods are 5 in. long by 2 broad. The tree is called *chicot* in Canada, and sometimes *stump tree*, from its dead appearance in winter, and the

absence of conspicuous buds. It is also called the *Kentucky coffee tree*, because the seeds were formerly roasted and ground as coffee in Kentucky. It grows well in Britain. The wood is used both by cabinet-makers and by carpenters. It has very little sap-wood. The pods, preserved like those of the tamarind, are said to be wholesome and slightly aperient.

GYMNODON'TES, Cuvier's genus of salt-water sun-fishes or globe-fishes (Linnæan, genus *diodon*), belonging to sub-order (Cuvier's order) PLECTOGNATHI, of the order of TELEOST fishes, which also includes the living trunk fishes and file fishes. They are noticeable for their resemblance to true ganoid fishes from their partly ossified endoskeleton and ganoid scales. See DIODON, *ante*.

GYM'NOGENS, in the botanical system of Lindley, are those plants with exogenous stems and perfectly naked seeds. He forms of them a separate class, of which *coniferæ, taxaceæ, cycadaceæ,* and *gnetaceæ* are the orders. They are remarkable for the large apparent perforation or disks in the vessels of the wood, but they have concentric zones, spiral vessels, and a central pith, like other exogenous plants. Their great peculiarities, however, are the total absence of a pericarp, and that fertilization takes place directly through the foramen of the ovule, without the intervention of style or stigma.

GYMNONOTI. See GYMNOTUS, *ante*.

GYMNOSO'MATA (Gr. naked-bodied), an order of pteropodus (q.v.) mollusks, destitute of shell, having a distinct head, and swimming by fins attached to the sides of the neck. They are all marine. The *clio borealis* of the arctic seas (see CLIO) is the best known and most interesting example.

GYMNOSO'PHISTS (i.e., "naked sages") the name given by the Greeks to those ancient Hindu philosophers who lived solitarily in the woods, wore little or no clothing, and addicted themselves to mystical contemplation and the practice of the most rigorous ascetism. Strabo divides them into Brahmans and Samans, the former of whom adhered to the strictest principles of *caste*, while the latter admitted any one into their number regarding whose character and kindred they were satisfied.

GYMNOSPERMS. See GYMNOGENS, *ante*.

GYMNO'TUS, a genus of malacopterous fishes, of which only one species is known, the celebrated *G. electricus*, or electrical eel. This genus gives its name to a family, *gymnotideæ*, of which, however, no other known species has any electrical powers. The *gymnotidæ* are mostly South American, inhabiting the fresh waters of the tropical regions. They are eel-like in form, and like eels are destitute of ventral fins (*apodal*), but they are furnished with complete jaws and with ribs, and their fin-rays are jointed or branched. They have pectoral fins, but no dorsal; the anal fin is largely developed, extending either to the point of the tail, as in the electrical eel, or leaving it free. The electrical eel has the skin entirely soft, and destitute of scales. It is very widely diffused over the warm parts of America, and is found both in streams and pools. Its electrical apparatus and powers are described in the article ELECTRICITY, ANIMAL. It is capable of being tamed, and when familiar, will allow itself to be handled without giving a shock, but employs its electrical powers both in order to kill prey and to defend itself from assailants, most frequently, perhaps, alligators. All the *gymnotidæ* are remarkable for the position of the anus, which is so very far forward as in the electrical eel to be before the gill-openings, whilst in some of the other fishes of this family it is even before the eyes. Some fishes of this family have an elongated snout. The electrical eel, however, has a rounder and more obtuse nose than the common eel.

GYNÆCEUM, the department for women in ancient Greek houses, where they were employed in various domestic occupations. It was always the innermost room. In Rome there was a gynæceum in which women were employed in making furniture and clothing for the imperial families.

GYNE'RIUM. See PAMPAS GRASS.

GYO'MA, a t. of Hungary, in the co. of Bekes, 89 m. s.e. by e. from Pesth, and on the railway between Pesth and Temeswar. It stands in a plain on the bank of the Körös, which is here crossed by a bridge. There is a Protestant church. Pop. '69, 9,907.

GYÖNGYÖS, a t. of Hungary, in the co. of Heves, is situated at the southern base of the Matra mountains, about 50 m. n.e. of Pesth. The last declivities of the Matra mountains produce an excellent red wine called by the Germans Erlauer, and very like Burgundy, for which, indeed, it is often mistaken. Gyöngyös has a gymnasium, manufactures woolen fabrics, and carries on trade in wine and fruit. Pop. '69, 15,830.

GYPAE'TOS. See LÄMMERGEIER.

GYPSIES (Egyptians), [Fr. *Bohémians*; Germ. *Zigeuner;* Dutch, *Heathens;* Dan. and Swed. *Tatars;* Ital. *Zingani;* Span. *Gitanos, Zincali;* Hung. *Czijányok, Pharaonepek;* Pers. *Sisech;* Hindu, *Karachee;* Arab. *Harami;* Gyps. *Rom* (man), *Sinte* (from Ind), *Calo* (black); nicknamed in Fr. *Cajoux, Geux;* Germ. *Zieh-Gauner,* etc.], a mysterious

vagabond race, scattered over the whole of Europe and parts of Asia and Africa. Whence they originally came, and what were the motives which drove them from their native soil, are questions which, after having passed through a long stage of helplessly absurd speculation, have of late years been ventilated by competent investigators, both linguists and historians, and are still but partially solved. So much only seems now established, that India, the cradle of many nations, was also the source from which they sprang. Whether, however, they are the Tshandalas of which the laws of Menou speak, or the kinsmen of the Bazeegars or Nuts of Calcutta; whether they belong to the Tshingani, a band of robbers near the mouth of the Indus, or are the descendants of those Luris—identical, according to Persian and Arabic authorities, with the Zuts or Djatts of northern India—whom Firdusi mentions as having been called into Persia by Bahram Gur to the number of 10,000, about 420 A.D., that they might act as musicians to the poor—cannot be affirmed with certainty, although there can be no doubt that theirs must have been at all times one of the poorest and most obscure tribes of India. The first considerable body left Asia for Europe before the 12th c., perhaps in consequence of disastrous encounters with the Arabian conquerors; and Tamerlane was unquestionably the cause of still more numerous emigrations in the 14th century. The first notice of them which occurs in European literature is embodied in a free paraphrase, in German, of the book of Genesis, written by an Austrian monk about 1122. They are there described as "Ishmaelites* and brasiers, who go peddling through the wide world, having neither house nor home, cheating the people with their tricks, and deceiving mankind, but not openly." Two hundred years later, we find them settled in Hungary (under Belus II.), at Cyprus, and in Wallachia. In 1417 they traveled in great hordes into Moldavia and many parts of Germany. In 1418, five months after the council of Constance, they appeared, about 1000 strong, before Zürich, commanded by a duke Michael "of Little Egypt," accompanied by several dukes and knights, and carrying with them a good supply of money, sporting-dogs, and other "marks of nobility." From Switzerland they descended into Italy, and in 1422 they showed themselves at Bologne and Forli. Another band, numbering, this time, according to the old Swiss historian, Stumpf, 14,000, arrived in the same year at Basel. On Aug. 17, 1427, a band of them, coming from Bohemia, made their appearance before Paris, which, however, they were not allowed to enter, but were lodged at La Chapelle Saint Denis. Other hordes succeeded these in the following years, spreading in rapid succession over all parts of Germany over Spain, England, Russia, Scandinavia, and, indeed, over the remotest parts of Europe. The account which they most frequently gave of themselves was, that they originally came from "Little Egypt;" that the king of Hungary had compelled about 4,000 of them to be baptized, had slain the remainder, and had condemned the baptized to seven years' wandering. Another version of their story was, that the Saracens had gone to war with them in Egypt, had subdued them, and forced them to renounce Christianity; that, after some years, they had been reconquered by the Christians, and that the pope, Martin V., had laid upon them, as a penance for the renunciation of the true faith, a life of wandering for the space of seven years, during which they were not to sleep in a bed. At the end of this period, they would be sent to a fine and fertile land. Yet another account was, that they were commanded by God to roam through the world for that period, in expiation of their want of hospitality toward Joseph and Mary—a notion which has, curiously enough, been partly revived in our own day by Roberts, with this difference only, that he proves them, from the prophecies of Isaiah, Jeremiah, and Ezekiel, to be descendants of the ancient Egyptians, and their wanderings to be the predicted punishment of the various iniquities of their forefathers.

At first they were well received. The romance with which they surrounded themselves, their pretended state of penitence, above all, the pomp and wealth they displayed, were sufficient to secure the good-will of the countries through which they passed—so much so, that letters of safe-conduct were given them by the emperor Sigismund, the genuineness of which there is no reason to doubt. Soon, however, the tide began to turn. Their resources gone, they were everywhere treated with contumely, and despised chiefly on account of the degrading arts of chiromancy, magic, and thieving, to which they again resorted for their support, like their earlier brethren, described by the monk. And with the reckless brutality characteristic of the middle ages, edict after edict was hurled against these "diviners and wicked heathens." The governments of Europe vied with each other in banishing, outlawing, and slaying them whenever and wherever found, and in most severely punishing those that dared to shelter them, chiefly "because of their traffic with the devil." These edicts remained in force in many countries down to the 18th c.; and Frederick the great, in 1748, renewed the law that every gypsy beyond the age of 18, found in his states, should be hanged forthwith. In England the most barbarous decrees against them were issued by Henry VIII. in 1531, and Elizabeth in 1563. In Scotland, where, under James V., a certain Johnny Faa had been officially recognized by the crown as lord and count of Little

* Ishmaelites—a notion perpetuated in the designation *Geschmeilim* of the Danish thieves' jargon, and the German *Rothwälsch* (Dorph, 44 and 45; Grolman, 65)—a term which has hitherto puzzled all investigators. Pott himself not excepted (cf. p. 28; Heister, p. 8), but which is nothing but a corruption of the Hebrew *Jishmaelim*—Ishmaelites.

Egypt, some of the severest edicts date from 1570, 1603, and 1609; and in 1624 Helen Faa, a descendant of Johnny, together with fifteen other women of the seed-royal, were condemned to be drowned. Towards the latter half of last century, however, more humane measures were adopted towards them, with a view to the improvement of their social and moral state. Maria Theresa, in 1768 and 1773 issued ordinances for the education of their children, and their gradual settlement as cultivators of the soil, chiefly in Hungary and Transylvania, where they swarmed in large numbers; special streets were built for them at the ends of the villages, and the name of Uj-Magyar, Uj-Parasztok (new peasants), was officially bestowed upon them. Joseph II. renewed these edicts in 1782 with certain modifications. Various other methods of gradually amalgamating them with the general population were tried elsewhere (a society was formed for that purpose at Southampton by the Rev. Mr. Crabb in 1832) but with comparatively little effect. They have continued—with few exceptions—their peculiar nomad life, with all its questionable resources and practices, its joys and its sorrows, unchanged, up to this day; and even gypsy children, brought up far from their tribe, in the midst of Christian families, have, driven by some mysterious and uncontrollable impulse, run away from their civilized homes as soon as a favorable opportunity offered.

Before proceeding to give a general outline of their present condition, we must briefly mention what have been the opinions held about them since the 15th c. by the learned. They have been, then, by turns set down as Egyptians, Nubians, Tartars, Cilicians, Mesopotamians, Assyrians, Ethiopians, Moors, Armenians, Manichæans, Banditti, and German Jews. More recently, they were, on account of the name of Zingari or Zingani—probably a corruption from their own name Sinte (from Ind), by which they are known in many countries of Europe—brought in connection with the Sigynnai, a people of Median origin, settled on the Danube, mentioned by Herodotus; with the Sigynni of Strabo, in the Caucasus; with the Usbecks, and a host of other tribes known and unknown. Again, their name has been derived from one Zinganeus, who, in 1517, when they had long been known as Zingani, fled with his followers to escape the vengeance of Selim. The now recognized theory of their Indian origin, proved incontestably by their language, was first positively advanced by Rüdiger in 1782; and in his track followed, with more or less success—collecting, comparing, or arranging new and old linguistic materials—Grellmann, Alter, Seetzen, Pottinger, Hoyland, Puchmayer, Ouseley, Danilowicz, Bischoff, Domeny de Rienzi, Graffunder, Richardson, bishop Heber, Pott (whose wonderfully exhaustive work on this subject made him the *facile princeps* of gypsologists), and more recently Paspati, Miklosich, Borrow, Leland, Smart, and Crofton. Bataillard wrote on the history of the gypsies without discussing specially their language.

This their language, then—a daughter of the old Sanscrit—has, besides giving the only real clue to their origin, also shed some rays over the dark period between their first emigration and their appearance in Europe. Originally the distinct mode of speech of a single and special border tribe of northern India, it has, during the many wanderings of the race, appropriated words from every country through which they passed; while, on the other hand, it lost many of its own words, and still more of its own inherent power and elegance, and much also of its resemblance to its mother and sisters. These adopted foreign words, their respective number, and their more or less corrupted state, point plainly to the gypsies having passed first into Persia, to their having remained there for a considerable time, to their having then wended their way to some Greek country, perhaps Asia Minor (the designations for 7, 8, and 9 being still Greek), and to their descent thence into Hungary, Cyprus, etc.

But their language also (Romany Tschib), though split into different dialects, has also remained almost the only tie which binds the widely-scattered nomad members together. Those of their branches who for centuries have had no intercourse with each other, would, although the strange elements in the other's speech would be incomprehensible to them, yet recognize each other at once by certain words and formulas indelibly written in the memory of the whole race. The outward appearance of the gypsies, who have been pronounced by competent writers to be one of the handsomest races of humanity, varies in some degree according to the climate under which they are born and in which they roam. Their chief characteristics, however, remain everywhere the same: tawniness of skin; slightly projecting, but agreeably formed cheek-bones; long hair, of the color and luster of coal; large black eyes, exquisitely shaped mouths, ruddy lips, teeth of a dazzling whiteness, slenderness and agility of limb, expressive features, and well-proportioned, often elegant build. Their women are, indeed, exquisitely beautiful when young, but they lose their good-looks at a very early period, partly on account of the squalor of their habits, and partly from their unsettled and precarious life. Like children, they are fond of showy colors in dress, and do not disdain to adorn themselves with even dubious trinkets and fine garments in a forward state of decay; but they always arrange their clothes, however poor, with great taste. Of their other qualities, their manners and customs, we can only say that they were, and still are, supposed to be cowardly, revengeful, and treacherous; that they allow themselves to be used as spies; are the associates of robbers and thieves; and that their women, chaste themselves, ply all sorts of questionable trades, chiefly selling poisons, and acting as go-betweens. It is further said that their language has no word for God,

immortality, soul—that, in fact, they have no religion whatever; that their marriages, contracted very early, are not binding; that they were, or are, wont to eat their parents; and that they are altogether a very criminal race. How much of all these charges is more founded on fact than their intercourse with demons, for which they have been so dastardly slaughtered in former days, we are not able to decide; certain it is, however, that their ethical code differs most essentially from that of other people (Gorgio), whom they despise on account of their childish credulity and brutal cruelty. They have proved themselves, on several occasions, bold and courageous as lions, but they prefer running away to fighting the battles of the foreigners; and it is also agreed on all hands, that they are passionately attached to their relations; that they are fatalists, and have a sort of fetichism or pantheism, though its peculiar form has never been revealed by them to any inquisitive tourist. At the same time, they belong outwardly to the religion of every country which they happen to inhabit, and repeat the process of baptism as often as they can, with a view, as some have it, to the presents of godfathers and godmothers. They believe in a metempsychosis or transmigration of souls, and refrain for that reason from eating certain animals (eels, etc.), although, generally, they are anything but choice in their food. They are dirty, lazy, fond of drinking and smoking. Their talent for music is remarkable in the extreme; their ears seize, and their instruments reproduce, after the first hearing, the most difficult and complicated pieces, even entire symphonies. Many famous artists (Kecskemecz, Bunks, etc.) have issued from their ranks; and their own melodies sounding over the wide Hungarian pushtas, the steppes of Russia, or through the streets of Jassy, are not easily forgotten. Some of them have indeed become the much-valued property of other nations, or are embodied in some of our favorite operas. No less wonderful is the grace and charm of their wild dances. Altogether, the gypsies are one of the most gifted races, the lost geniuses, so to say, of humanity. The real truth about them, their traditions, and religion, will we fear, be ever kept a secret. The statement of Borrow, who has lived so long among them, that their entire catechism is summed up in the three precepts: "Be true to your people—be faithful to your husbands—and never pay any debts except those owing to your own kindred," must, we fear, be received with the same degree of caution which, we are sorry to say, has to be applied to many other statements about their manners and customs contained in his othewise useful *Gypsies in Spain*. The incredibly absurd descriptions of the Jewish marriage-ceremonies, about which we do possess the fullest and most authoritative information, given there as a counterpart to those of the gypsies, show plainly how easily and abundantly his good-natured credulity must have been worked upon.

The increase of population, and the growth of culture all over Europe, are their worst enemies. Their forests are cut down, their heaths inclosed, the houses are pushed right into their commons; and the easy and remunerative belief in their secret arts is waning more and more. It is doubtful, indeed, whether they will, as a separate race, survive many more centuries in Europe. Their numbers at this moment are stated so very differently, that we would fain caution the reader against an implicit belief in the following figures, which we extract from the comparatively most reliable authorities: in Hungary, 140,000; in Transylvania and the principalities, 162,000; Spain, 40,000; England and Scotland, 18,000 (their chief families in these countries being the *royal* Lees, the Stanleys, Coopers, Hernes, Smiths, Lovells, etc.); Poland, 2,000; Russia, 10,000; Germany, France, and Italy, 40,000; Norway, 1500. Althogether, including those in Turkey and in Asia and Africa (their sojourn in Mexico is questionable), they are computed at about five millions (Rienzi). A small portion only of these occupies as a body fixed habitations in Hungary and Transylvania, where they are agriculturists and goldwashers; and in the principalities, where they live in a kind of serfdom, and are divided into four different classes—Rudari or Aurari (gold-seekers), Ursari (bear-leaders), Lingurari (manufacturers of and dealers in wooden spoons, mouse-traps, etc.); and Laïessi (masons, smiths, tinkers, etc.). All the rest lead a roaming life, live in kennels and under tents from one end of the year to the other, gaining their scanty livelihood, like their forefathers, as best they can, fearing and detesting nothing so much as a fixed and continuous occupation, which would take them away from "their free mountains, their plains and woods, the sun, the stars, and the winds."

The following is a specimen of their language in the form of a short improvised stanza:

Poraquel luchipen abajo
Abillela un balichoró,
Abillela á goli goli,
Ustilame Caloró.

There runs a swine down yonder hill,
As fast as e'er he can,
And as he runs, he crieth still;
Come steal me, gypsy man.

GYPSY-WORT, *Lycopus Europæus*, a perennial plant of the natural order *labiatæ*, with stem about 2 ft. high; opposite, ovato-lanceolate, scarcely stalked, almost pinnatifid, wrinkled leaves; and dense whorls of small whitish flowers with purple dots, the limb of the corolla 4-cleft and nearly equal; only two stamens perfect. It grows in ditches

and wet places, in Britain and on the continent of Europe. It is a febrifuge. The juice stains cloth a permanent black color, and gypsies are said to use it to give a dark hue to their skin, whence the English name gypsy-wort, and the French *herbe des Bohemiens.*

GYPSUM, a mineral consisting essentially of sulphate of lime and water, the proportions of its constituents being lime, 32.56; sulphuric acid, 46.51; water, 20.93. It is very widely diffused, occurs in great abundance in many parts of the world, and is found in rocks and strata geologically very different, as in transition rocks, in secondary and in tertiary formations. It often occurs in nests or kidney-shaped masses in clay or marl. It is found above chalk in many places, and large quantities of it are quarried in some parts of England from the red marl immediately above the great bed of rock-salt. It sometimes occurs in beds many feet thick. It is transparent or opaque, white, yellowish-white or gray, or even yellow, red, brown, or black, according to its purity of chemical composition or the quantity and nature of impurities present. It is also compact, fibrous, foliated, or earthy; sometimes crystallized in six-sided prisms or in lenses. Twin crystals are frequent. It is easily broken, scratched, and cut. Before the blowpipe, it becomes opaque, if not already so, and fuses into a white enamel. The water which it contains is driven off by a heat of about 272° F., and it is then easily reduced to powder, in which state it is well known as *plaster of Paris.* Unburned gypsum is tough, and not easily reduced to powder. Gypsum is soluble in cold water, to the extent of about one part in 461, and is a frequent ingredient in the water of springs; it is scarcely more soluble in boiling water or in acids. To this solubility in water, although so slight, must be ascribed the value of gypsum as a manure; the further chemical explanation of which, however, still remains to be ascertained, although theories have been proposed by sir Humphry Davy and by Liebig, the former supposing the gypsum to act chiefly by itself, becoming the nutriment of the crops to which it is most beneficially applied; the latter supposing it to act chiefly by fixing the ammonia of the atmosphere and conveying it to their roots. As a manure, gypsum is more extensively used in some parts of the continent of Europe and of North America than of Britain. In North America, it is reduced to a fine powder by mills, in order to be used as a manure, for much of its value depends on the fineness of trituration. To clover crops, the application of gypsum is particularly beneficial, and although it does not produce much benefit in its direct application to grain crops, yet in an alternation of wheat and clover, the crop of wheat is larger because of the liberal supply of this mineral manure to the clover. An excess of gypsum, however, is prejudicial, as has been found in some parts of England, where the subsoil containing it in great quantity has been rashly brought up by the plow.—Gypsum, deprived of its water by burning, and reduced to powder, forms a paste which almost immediately *sets*, or becomes firm and solid, when mixed with its own bulk of water; hence the great use of *plaster of Paris* for making casts and cornices. But if the gypsum is burned at too great a heat, it refuses to set, and the powder of the mineral called *anhydrite*, which is an anhydrous sulphate of lime, has not the property of setting.—One of the finest varieties of uncrystallized and untransparent gypsum is alabaster (q.v.).—*Satin spar* is a beautiful fibrous variety of gypsum, exhibiting a fine play of light, and employed for necklaces, inlaid-work, and other ornamental purposes, but having the disadvantage of being easily scratched.

GYRA'TION, CENTER OF. See CENTER OF GYRATION.

GYRENCEPHALA, certain mammals including quadrumanous primates, carnivores, ungulates, proboscidians, cetaceans, etc., in which the superfices of the cerebrum lie in convolutions, and the cerebrum extends over more or less of the cerebellum, and over the olfactory nerves.

GYR-FALCON, or JER-FALCON (*falco gyr-falco* or *F. islandicus*), a species of falcon (q.v.) of large size, the female, which is the largest, being about 2 ft. in entire length; the plumage almost brown when the bird is young, but gradually changing to white as it advances in age, the white margin of each feather encroaching on its brown center, until aged birds are almost pure white. It is rarely seen in Britain, and very rarely in the southern parts of the island, but inhabits all the very cold northern parts of the world. It was formerly in high esteem for falconry, and was procured at great expense from Iceland and Norway. It is sometimes called ICELAND FALCON, and sometimes GREENLAND FALCON.

GYRI'NUS, a Linnæan genus of coleopterous insects, now constituting a family, *gyrinidæ*, closely allied to *dytiscidæ*, or water beetles (see DYTISCUS), but differing in having the antennæ very short, the two fore-legs long and stretching forward like arms, the other legs very short and comparatively broad. The eyes are divided by horny processes, so that each of them almost becomes two. The body is oval, as in the *dytiscidæ*. The *gyrinidæ* are very generally characterized by metallic brilliancy of color. They are mostly small insects. They fly well, swim and dive well, spend the winter in the mud at the bottom of ponds, and in spring and summer may be seen swimming very actively on the surface of the water, ready to dive on the slightest alarm. In

diving, they carry down with them a bright bubble of air. They generally swim in little parties, seeming to chase each other in circles, whence their French name, *tourniquets*, and their English name, *whirligigs*. They feed on smaller aquatic animals, which they seize in their gyrations. They deposit their eggs on the leaves of aquatic plants. Their larvæ are aquatic, having their bodies composed of thirteen deeply divided rings, of which three bear the feet, and the rest bear filaments probably serving as organs of respiration. The most common British species is *gyrinus natator*, a smooth shining blackish insect, three lines long.

GYROMANCY (*gyros*, a circle, and *manteia*, prophecy) was a method of divination by means of a circle, and was generally performed in the following manner: the soothsayer described a circle, and marked it all round with letters; then he commenced to walk round the circle, repeating his incantations, and at the places where he stopped the letters were carefully noted, and by the interpretation put upon these letters, the answer of the god was obtained.

GYROPHORA. See TRIPE DE ROCHE.

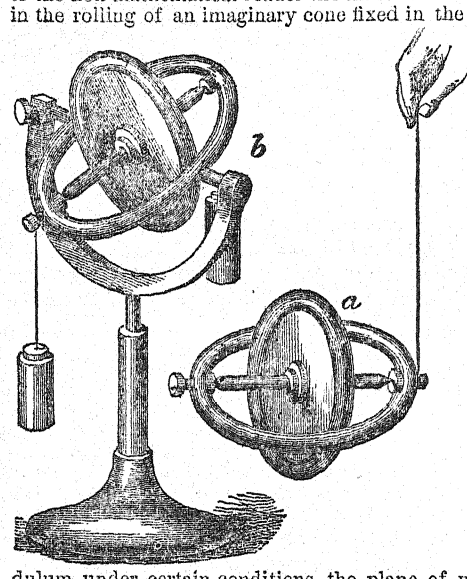
GYROSCOPE, an instrument invented by M. Foucault to render palpable to the eye the earth's rotation. Its success depends on the principle, that if a mass be set in rotation freely in space, it will, unless disturbed or constrained, preserve absolutely the plane of its rotation, and will, to effect this, even overcome slight obstacles. In the gyroscope, a heavy ring of metal is almost freely suspended by mechanical contrivances, after having communicated to it a very rapid motion, and to maintain itself in the plane of its rotation, while the earth in revolving on its axis turns round the whole mechanism, it causes a graduated slip to move round under a telescope placed in position, and so renders the earth's motion palpable to the eye.

GYROSCOPE (Greek) [from *Supplement*] is the name given to an instrument for the exhibition of various properties of rotation and the composition of rotations. It differs from a top in having both ends of its axis supported. The invention is probably French or German, and in some of its forms it dates from about the end of the last century; but no certain information can be obtained on these points. We will consider only two of its many applications.

First, if a mass be set in rotation about its principal axis of inertia of greatest or less moment, it will continue to revolve about it; and, unless extraneous force be applied, the direction of the axis will remain unchanged. Such, for instance, would be the case with the earth, were it not for the disturbances (see NUTATION and PRECESSION) produced by the sun and moon; the direction of the axis would remain fixed in space (i.e., the pole-star would be always the same star), in spite of the earth's motion in its annual orbit. It is for this very reason that modern artillery is rifled, so that the projectile revolves about its axis. If, then, a mass of metal, as, for instance, a circular disk, loaded at the rim, and revolving in its own plane, be made to rotate rapidly about its axis of greatest moment of inertia, and if it be freely supported (in gimbals, like the box of a compass), the direction of its axis will be the same so long as the rotation lasts. It will therefore constantly point to the same star, and may, of course, be employed to show that the apparent rotation of the stars about the earth is due to a real rotation of the earth itself in the opposite direction. This application was made by Foucault shortly after his celebrated pendulum (q.v.) experiment, and he is generally looked upon as the inventor. The *Transactions of the Royal Scottish Society of Arts*, however, show that this application of the gyroscope was made many years before (Mar., 1836), by Mr. E. Sang, C.E. It is, in practice, by no means so perfect a mode of proving the earth's rotation as the Foucault pendulum; but this arises solely from unavoidable defects of workmanship and materials—the mass of the gimbals, and the friction on the pivots. Prof. Smyth, the Scottish astronomer-royal, has recently applied this property of the gyroscope to the improvement of our means of making astronomical observations at sea. A telescope, mounted on the same support as the ends of the axis of the gyroscope, will, of course, be almost unaltered in position by the rolling or pitching of a vessel; and a steady horizon, for sextant observations of altitude, is procured by attaching a mirror to the support of the gyroscope, and setting it once for all by means of spirit-levels. The mechanical difficulties of construction have not yet been quite got over, but there seems to be little doubt that this application will some day be of very great practical value.

But the most singular phenomena shown by the gyroscope are those depending on the *composition* of rotations. We have already seen (ROTATION) that any motion whatever of a body which has one point fixed is of the nature of a rotation about an axis passing through that point. Hence, simultaneous rotations about any two or more axes, being a motion of some kind, are equivalent to a rotation about a single axis. The effect, then, of impressing upon the frame in which the axis of the gyroscope is suspended a tendency to rotate about some axis, is to give the whole instrument a rotation about an intermediate axis; and this will coincide more nearly with that of the gyroscope itself, as the rate of its rotation is greater. It is hardly possible to explain

to the non-mathematical reader the exact nature of the compound motion, which consists in the rolling of an imaginary cone fixed in the gyroscope upon another fixed in space; but the rotation of the axis of a top round the vertical (when it is not "sleeping" in an upright position), and the precession of the earth's axis, are precisely similar phenomena. Thus, when the gyroscope is spinning, its axis being horizontal, a weight attached to the framework at one end of the axis (fig. *b*) makes the whole rotate about the vertical; attached to the other end, the rotation takes place in the opposite direction. And the framework may be lifted by a string attached near one end of the axis (fig. *a*) without the gyroscope's falling. Its axis still projects horizontally from the string, but it revolves as a whole round the string. Various other singular experiments may be made with this apparatus; and others, even more curious, with the gyrostat of W. Thomson (q.v.), which is simply a gyroscope inclosed in a rigid case, by which the ends of its axis are supported. When a gyrostat is made the bob of a pendulum under certain conditions, the plane of vibration of the pendulum turns, as in Foucault's celebrated experiment, but in general at a much greater rate.



GYROVAGI, *wandering monks*. Monasticism, as it spread in the ancient church, took, almost immediately, the form of life in common in monasteries. Anthony, the chief originator of the institution, while for a long time he persistently sought a hermit's life for himself, found many seeking out his most lonely retreats and planting themselves near him, in order to imitate his example. At length, compelled to yield to their importunity, he induced them to live together, and to adopt rules, to some extent at least, for governing both their devotions and their work. Thus the rudiments of monasteries grew up in the remote mountain wilds. Many useful and beneficent consequences followed the increasing establishment of them through the deserts of Egypt and along the shores of the Euxine. A generous hospitality prevailed in them all. The traveler was welcomed and supplied with lodging and food. The Cœnobites of Egypt, especially, raised corn abundantly, and sent ship-loads of bread and clothing to the poor of Alexandria. But at the same time wild and ridiculous excesses grew naturally out of the system. Bands of roving devotees, known in different places by different names, infested whole districts of country from the Nile to the Black sea. Some of them, professing to practice continually mental prayer, were named *euchites*. Others, given to mystical dancing, were called *choreutes*, and a third class were *enthusiasts*, indulging in pretended spiritual communications. They abandoned all useful employments and all regular practice of devotion; although they professed to give themselves up to spiritual contemplations, which not unfrequently, through necessary reaction, degenerated into gross licentiousness. Similar wandering habits prevailed in connection with western monasteries, which were also, at first, centers and schools of useful industries of various kinds. Many monks, breaking away from conventual discipline, traveled from place to place and from convent to convent, entertained a short time at each, according to the generous hospitality practiced at them all, but evading all propositions to stay permanently at any. When they had gone round the whole circle they from necessity began again. From this feature of their history, some of them had the epithet *gyrovagi*—circulating vagabonds or tramps—fastened on them. Isodore of Seville extended the appellation also to the *circumcelliones* (q.v.); and it is equally appropriate to the whole tribe, the earliest as well as the latest, in the east as well as the west. They were all a great nuisance in the convents, carrying everywhere idleness and vice in their train. Augustine wrote strongly against them. Benedict made his rules with them specially in view. Columbanus condemned the monastic degeneracy which they had done so much to produce. But not until the time of Charlemagne were they effectually restrained. The later *mendicant* orders seem to be in some measure their successors.

GYU'LA, a t. of Hungary, in the co. of Bekes, is situated on the White Körös, which divides it into the German and Hungarian quarters, 30 m. n. of the town of Arad. The trade is chiefly in cattle. Pop. '69, 18,495.

GYTHIUM, a t. in ancient Achæa, on the Laconian gulf near the site of the modern port Marathonisi. It lay opposite the island Cranæ, at the foot of the fertile valley of

the Gythius. On its coins the common types are Apollo and Heracles, the founders of the city. Heracles, the Phenician god Melkart, points to an early connection with Tyre. The Phenicians maintained a great trade with the shores of the Laconian gulf, and Aphrodite Migonitis, the Phenician Astarte, had a temple at Migonium, the modern Marathonisi. Aphrodite and Asclepius also occur on its coins, and the latter had a temple in the city. A great port in the period of Phenician intercourse, Gythium became a secondary town after the Dorian conquest, as is proved by the absence of early coins; and it is only after the decay of Sparta that it again becomes an important city. It was the ordinary station of the Spartan fleet, and was considered a port of Sparta, from which it was distant about 30 miles. In the wars against Athens it was therefore exposed to frequent attacks. Tolmidas, the Athenian commander, burned it 455 B.C. Later it was besieged unsuccessfully by Epaminondas, 370 B.C. It was strongly fortified by the tyrant Nabis; but he was compelled by Flamininus to give up Gythium and other coast towns to the Achæan league, 195 B.C. When, soon afterwards, the whole country became a Roman province, Gythium had its own magistrates. Augustus made it one of the twenty-four Eleuthero-Laconian towns. The existing ruins, called Paleopoli, are all of the Roman period. According to Strabo, it had an artificial harbor, of which no trace is now seen. In the town was a well sacred to Asclepius, and at three stades' distance was the stone Argos, where Orestes was relieved from his madness.

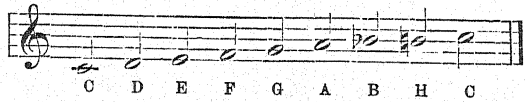
H

H THE eighth letter in the English alphabet, belongs to the order of gutturals, and is a mere attenuation of the sound indicated by the Greek χ and the German (and Scotch) *ch*. The tendency of guttural sounds to become lighter and lighter, and at last disappear, is strikingly seen in tracing the history of the letter *h*. The form of the character corresponds to the Phenician or Hebrew *cheth* (ח) and the Greek *eta* (Η, probably at one time pronounced *heta*) which denoted originally the *syllable che*. The Greeks dropped the guttural part of the sound, and took the character to mark the vowel *ē*, while in the Latin alphabet it was taken to mark the (faint aspirated) guttural. That the sound of *h* in Latin must have been faint, is proved by the fact, that many words were written indifferently with or without an *h*; as *honustus* or *onustus; aheneus* or *aëneus*. In the languages derived from the Latin, the force of *h* has almost disappeared. It is retained in French as a character, but is scarcely heard in pronunciation. The Italian language altogether ignores the character. In Spanish, it has taken the place in many cases of the Latin *f*, as *hijo* = Lat. *filius*, a son; *humoso* = *fumosus*, smoky.

In the languages of the Gothic stock, *h* often represents the hard guttural sound of *k* or *c*. See letter C. This substitution, and the subsequent disappearing of *h*, especially before *r* and *l*, have completely disguised the relationship of many words which are yet of the same root: e. g., Eng. *raw*; Ang.-Sax. *hreaw;* Lat. *cru*-or, blood, *cru*-dus, bloody, raw.

The natural tendency in English, as in other tongues, is to attenuate the sound of *h*, and altogether eliminate it. This tendency is strongest among the illiterate, who are unrestrained by the presence of the written character; and accordingly "to drop one's *h*'s' (e. g., *am* for *ham*) is a sign of the want of education and of vulgarity. The perversity of putting *h* where it ought not to be (e. g., *heggs* for *eggs*), is not easily accounted for.

The Germans use the letter H, in their musical notation, for the same note which we call B, while they call our B flat simply B; possibly from the flat seventh being more nearly related to C, as a fundamental note, than B natural the sharp seventh is, which they designate H. Thus,



HAAR'LEM, the chief t. of a district of the same name in the province of north Holland, is a clean, well-built city, lying on the shores of the Spaarn, 12 m. w. of Amsterdam, and intersected, like most Dutch towns, with canals and avenues of trees. Pop. '75, 33,364. Haarlem is the seat of government for the province, and the see or a Catholic bishop. Among its 13 churches, the principal is that known as the great of St. Bavo's Kerk, which was built in the 15th c., is one of the largest in Holland, and specially noted for its lofty tower and famous organ, constructed by Müller of Amsterdam, which, till recently, was the largest of its kind, having 5,000 pipes, 60 stops, and 4 rows of keys. Before the church stands a statue of Laurens Coster (q.v.), to whom his countrymen ascribe the invention of printing. Among the buildings worthy of note are the town-hall, with its fine carvings, formerly the residence of the counts of Holland; the palace of the states-general; the prison; and the Teyler institution, richly endowed

to defend the Christian religion and promote science and the fine arts. It has also a handsome building occupied by 24 poor old women, and has numerous scientific and antiquarian collections. Haarlem has a good gymnasium, numerous academical, scientific, and benevolent institutions, and also a national normal school for training teachers. Although Haarlem is no longer celebrated, as in former times, for its flourishing trade, it still possesses extensive refineries of salt, tanneries, foundries for type, various manufactories of silk, linen, and thread, and an extensive trade in flowers, sending its tulips, hyacinths, and other bulbs, to the value, in 1874, of £37,500, to every part of Europe. Haarlem was a flourishing town as early as the 12th c., when it took an important part in the wars between the Hollanders and West Frisians. At the close of the 15th c., it lost its privileges, and suffered severely during the revolt of the peasantry; and during the war of independence, it underwent a seven months' siege in 1573–73, which is unparalleled in the annals of history for the heroism evinced by the citizens. The wood of Haarlem is a great ornament to the city, and a favorite place for recreation. Haarlem has railway communication with Amsterdam, Rotterdam, and the Nieuwe Diep.

HAARLEM LAKE, which is now drained (see POLDER), lay between the towns of Haarlem, Leyden, and Amsterdam, and communicated with the Zuider Zee by "Het Y." Before its drainage (1839–52), it embraced the four ponds of Haarlem, Leyden, Spieger, and Helle, which, in consequence of an irruption of the sea in the 16th c., when several villages were destroyed, had merged into one vast sheet of water, and in the course of time encroached so far upon the adjacent land as ultimately to cover an area of more than 60,000 acres. The depth did not exceed 15 ft., more than half of which was composed of mud and clay, from which the Dutch prepared a kind of brick known as "klinkers," used for purposes of paving. The lake frequently rose during storms to an alarming height, necessitating a large annual outlay in keeping the dams and sluices in repair. In consequence of the damage done to Amsterdam and Leyden by an overflow of the lake in 1836, the government entered into an agreement with a company of English engineers to drain it. This undertaking was effected by several gigantic steam-engines, by which the water was pumped up into a canal, formed round the circumference of the lake, and connected with the Ij by various outlets. By these means the waters were drained off, except channels for the purpose of drainage, and more than 50,000 acres of good land reclaimed, producing large crops of colza, flax, wheat, rye, barley, oats, madder, mustard, and other seeds. In 1874 there were 2,867 horses, 5,897 head of cattle, 7,923 sheep, and 1803 goats. Pop. '75, 12,570, with 2 Dutch Reformed, 2 Dissenting churches, and 3 Roman Catholic chapels.

HABAKKUK, Greek forms, *Ambakoum*, *Abacum*, etc.; Latin, *Ambacum*, *Ambacuc*, *Abacuc*), the eighth of the twelve minor prophets. No account whatever is contained in the book itself either of the events of his life, or even the date when he lived; and the numberless conjectures that have been made respecting him are unworthy of notice.

In turning to the book itself, we find him, first of all, bewailing the general corruption of his people, and prophesying the speedy vengeance of God by the hand of the Chaldeans. These, however, shall, when they have fulfilled the divine wrath, perish suddenly themselves, because of their own iniquities; and the prophet winds up with thanks for this just retribution. It is evident from this that Habakkuk must have lived at a late period, about the time of Nebuchadnezzar's invasion; but whether he wrote, as the rabbinical traditions suppose—at the time of Manasseh, or as others (Keil, Davidson, Delitzsch) assume, at the early time of Josiah, or, finally, in the days of Jehoiakim, according to Ewald, Rosenmüller, Knobel, Meyer, De Wette, Hitzig, Stähelin, are points upon which we cannot enter. We must not omit to mention here, that the various chapters have also been supposed to have been written under different successive kings (Rosenmüller, Kalminsky, etc.); but the unity of the whole book is so obvious, that this notion has been almost unanimously rejected.

Critics have, in all times, been unanimous in their praise of the style of this prophetic composition. It ranks, indeed, for grandeur and sublimity of conception, for vigor and fervor of expression, for gorgeousness of imagery, for melody of language, among the very first productions of sacred literature. It is more especially the peculiar strophic arrangement of the second chapter, with its awful four "woes" denounced against the Chaldeans, and above all, that matchless "Pindaric Ode," as Ewald calls the third chapter, which have challenged universal attention and admiration.

HABAKKUK, BOOK OF (*ante*), consists of two parts: I. *The Foretelling of the Chaldean invasion of Judea.* 1. The prophet complains of the prevalence of iniquity and violence among the Jews. 2. God replies, threatening to punish them by allowing the Chaldeans to come against them. 3. The prophet then humbly expostulates with God for using, as an instrument in punishing the Jews, a nation more guilty than they. 4. God again replies, promising that he will, at the right time, deliver his people, and will fill the earth with the knowledge of his glory. 5. The destruction of the Babylonian empire is foretold with attending judgments on the Chaldeans for their covetous exaltation of themselves on the ruin of others; their murderous violence in building up their cities; their enticement of men to drunkenness as a means for effecting their fall; and their extension of idolatrous worship. II. *The prophet's prayer followed by a sublime*

ascription of praise and declaration of continued trust. 1. Prayer that God would give increased energy to his promised work of mercy that reaches through the ages. 2. Praise for his interposition in behalf of his people in Egypt, at the Red sea, and in the promised land. 3. Expression of confidence in him that, in times of utmost want and peril, he will give triumphant deliverance.

HAB'EAS COR'PUS, WRIT OF, a writ directed by courts of law or equity to produce the body of a person illegally detained, and to state the reasons of such detention, so that the court may judge of their sufficiency. This writ is one of the chief guards of English liberty, and the envy of foreign nations, being one of the best securities against tyranny ever devised. It is often erroneously supposed that this efficacious protection of personal freedom was first bestowed by the statute of 31 ch. II. c. 2, called the habeas corpus act. But the true foundation of that act, as well as of many other cardinal principles of the English constitution, is to be found in the great charter, or Magna Charta, of which Hallam (1 *Const. Hist.* 16) observes: "No freeman could be detained in prison except upon a criminal charge on conviction, or for a civil debt. In the former case, it was always in his power to demand of the court of king's bench, a writ of *habeas corpus ad subjiciendum*, directed to the person detaining him in custody, by which he was enjoined to bring up the body of the prisoner, with the warrant of commitment, that the court might judge of its sufficiency, and remand the party, admit him to bail, or discharge him, according to the nature of the charge. This writ issued of right, and could not be refused by the court." The great charter, as prof. Creasy sums up this part of its substance, "contained two great principles. First, that no man shall be imprisoned on mere general grounds of suspicion, or for an indefinite period, at the discretion or caprice of the executive power; but that imprisonment shall be only inflicted as the result of a legal trial and sentence, or for the purpose of keeping in safe custody, when necessary, an accused person on a definite charge, until he can be tried on that charge. Secondly, that, as a general rule, every person accused of a criminal offense shall have the question of his guilt or innocence determined by a free jury of his fellow-countrymen, and not by any nominee of the government." And Blackstone, with great spirit, thus discourses on the social and political effects of this feature of the British constitution (1 Bl. *Com.* 135): "Of great importance to the public is the preservation of this personal liberty, for if once it were left in the power of any the highest magistrate to imprison arbitrarily whomever he or his officers thought proper, there would soon be an end of all other rights and immunities. Some have thought that unjust attacks, even upon life or property, at the arbitrary will of the magistrate are less dangerous to the commonwealth, than such as are made upon the personal liberty of the subject. To bereave a man of life, or by violence to confiscate his estate without accusation or trial, would be so gross and notorious an act of despotism, as must at once convey the alarm of tyranny throughout the kingdom; but confinement of the person by secretly hurrying him to jail, where his sufferings are unknown or forgotten, is a less public, a less striking, and therefore a more dangerous engine of arbitrary government. And yet, sometimes, when the state is in real danger, even this may be a necessary measure. But the happiness of our constitution is, that it is not left to the executive power to determine when the danger of the state is so great as to render this measure expedient, for it is the parliament only or legislative power that, whenever it sees proper, can authorize the crown, by suspending the habeas corpus act for a short and limited time, to imprison suspected persons without giving any reason for so doing."

The habeas corpus act, which was passed in 31 ch. II. c. 2, therefore did not introduce any new principle, but merely defined with greater precision and detail the appropriate remedies, in consequence of the frivolous objections made by the judges in the preceding reign. The substance of these details is as follows: Where any person is committed and charged with crime, the lord chancellor or any of the judges may, unless there has been great delay in application, issue the writ, and order the person to be brought up and discharged with or without bail. The writ is to be obeyed more or less promptly according to the distance, but in no case must the delay exceed twenty days. Any officer or keeper neglecting to deliver a copy of the warrant of commitment, or shifting the prisoner to another custody without cause, shall forfeit £100, and for the second offense £200, and be disabled to hold office. No person once delivered by *habeas corpus* shall be recommitted for the same offense under a penalty of £500. Every person committed for treason or felony may insist on being tried at the next assizes, or admitted to bail, unless the crown witnesses cannot be ready in that time; and if not tried at the second assizes or sessions, he shall be discharged from the imprisonment. The prisoner may apply either to the court of chancery, or to the courts of queen's bench, common pleas, or exchequer, and any judge denying such writ is liable to a fine of £500. The writ may be applied for by persons confined in any part of England, or Jersey and Guernsey. Indeed, it was recently held, in the case of Anderson the fugitive slave, that this writ could be applied for by a person confined in Canada or any other of the colonies, even though there were courts established there which had previously been applied to, and had the power to issue the writ, but refused to do so. The judges of the queen's bench, on examining the authorities, held that this prerogative power had always been inherent in the English court in favor of British subjects wherever imprisoned, except in a foreign country, and had

never been taken away by express statute. There has now, however, been passed a statute (25 Vict.) depriving the English courts of this jurisdiction over the colonies, whenever local courts exist by which such a jurisdiction can be exercised.

As the habeas corpus act extended only to cases where persons are imprisoned on criminal or supposed criminal charges, the other cases being left to the operation of the common law, which was found defective, the statute 56 Geo. III. c. 100 was passed, which extended the writ to other cases. Under this last act, any person confined or restrained of his liberty (otherwise than for criminal matters, and except persons imprisoned under a judgment or decree for debt), may apply to any judge of the common law courts for a *habeas corpus*, on showing by affidavit that there is a reasonable and probable ground for complaint.

The result is, that in all cases whatever where a person, whether man, woman, or child, is illegally confined in England, the remedy is for some friend to apply for a *habeas corpus*, which, on a good *prima facie* case, will be issued to the person who so illegally confines the applicant; and if such person refuses to make a proper return—that is, show good legal grounds for what is done—he will be committed for contempt. If the party is confined under recognized authority, as a child by a parent, these facts must be stated. If the party is confined under some legal authority, then the warrant of commitment must be produced, and the rule is that such warrant must set forth the subject matter, and the jurisdiction of the judge or justice who so committed the party, so that the legality of the imprisonment may be judged of.

The habeas corpus act does not extend to Scotland, but in that country similar redress is provided to the subject under the wrongous imprisonment act, 1701, c. 6 (q.v.), which is often called the Scotch habeas corpus act.

Habeas corpus is also the formal commencement of several other legal writs in English law of a kindred nature to that last mentioned, and which is strictly called the writ of *habeas corpus ad subjiciendum*. Thus, the *habeas corpus ad respondendum* is a writ issued by a common law court to bring up a prisoner to serve him with a writ in another action. So a *habeas corpus ad satisfaciendum* is a similar writ to take the prisoner in execution for another cause of action. *Habeas corpus ad testificandum* is the writ by which a prisoner is brought up by the jailer to give evidence as a witness in a court of justice.

HABEAS CORPUS (*ante*), sometimes called "the great writ of personal liberty," is an inheritance of this country from England, and the grandest safeguard against despotism which jurisprudence affords. It is a writ of rights. Any person restrained of liberty from whatever cause is entitled to it upon petition under oath, and if his imprisonment is adjudged by a court having jurisdiction to be illegal, he will be set at liberty. The writ proceeds upon the assumption that every human being, unless he is either convicted or accused of crime and held for trial and punishment in due process of law, is entitled to freedom from bodily restraint. A court having power to issue the writ must issue it upon application in due form, and, after examination, must pronounce judgment upon the case before him. The person to whom the writ is addressed must come into court, bring his prisoner with him, and make disclosure of the grounds upon which he is held. Disobedience to the order of a court in such a case subjects the offender to severe punishment. The scope of the writ is very broad, even covering the case of a child who is restrained by one of its parents from intercourse with the other. In such a case the court will determine whether the parents have equal rights in the child, and if not, whether the father or mother is its lawful custodian. In the days of slavery the writ was often issued in behalf of slaves who had escaped from their masters, and when it was shown that the masters themselves had brought them into a state where slavery was unlawful, the court set them free. Chief-justice Shaw of Massachusetts was the first to avow and act upon this principle; but afterwards, in cases where slaves had run away from a state in which slavery was regarded as lawful, and the master had caused them to be arrested by the authority of the United States, he refused to interfere in their behalf. There were not wanting men eminent for legal learning who held that this writ, if it were only enforced in the spirit of the English law, as expounded by lord Mansfield in the celebrated Somerset case, brought to his attention by the pertinacity of Granville Sharp, would free every slave in the United States; it being held that slavery here had never been established by law, but was a usurpation from the beginning, and contrary to the genius of republican institutions. It was upon this principle, if not by this process precisely, that slavery was abolished in Massachusetts; and if the principle could have been made effective in all the states of the union, the slaves would have been emancipated peacefully and the country saved from the horrors of a desperate and bloody civil war. So important did the fathers deem the writ of *habeas corpus* that they inserted in the constitution of the United States (art. I., sec 9) an express provision that it should not be suspended "unless when in cases of rebellion or invasion the public safety may require it." The question whether the power to suspend is vested in congress or the president, or in each alike, has been much disputed. The power was exercised by the president during the late rebellion, with the tacit consent or express permission of congress. The power of the federal courts to issue the writ is limited in its scope by certain well understood principles, but that power, as far as it extends, is

sovereign. No state court has a right to issue the writ for the discharge of a person held under the authority of the federal government. It cannot, for instance, discharge a soldier of the United States upon any pretense whatever, or inquire into the legality of the detention of a prisoner by the national authority. The national courts alone have jurisdiction in such cases. The proceedings upon a return of a writ may take place in chambers before a single judge or before several judges in open court, according to the terms of the writ itself.

HABEN'DUM, in English law, is the name given to a clause in a deed of grant or lease, in which clause the kind and nature of the estate is described, and it is stated for how long the estate is to be held.

HABE'RE FA'CIAS POSSESSIO'NEM, in English law, is the name of the writ which issues after a successful plaintiff has recovered judgment in an action of ejectment. He then calls on the sheriff, by this writ, to put him in possession of the land or premises, and the sheriff executes it by breaking open the doors, if necessary, and then delivering over the possession to the plaintiff. *Habere facias seisinam* is a similar writ, now superseded by the last.

HABER'GEON, a short coat of mail, consisting of a jacket without sleeves. In early times, the habergeon was composed of chain-mail; but in the 14th c., a habergeon of plate-armor was worn over the hauberk. See HAUBERK.

HABERSHAM, a co. in n.e. Georgia, on the South Carolina border, on the headwaters of the Chattahoochee river; 450 sq.m.; pop. '70, 6,322—949 colored. The surface is rough. Iron, gold, rubies, and diamonds have been found. Corn and tobacco are the main products. Co. seat, Clarksville.

HABERSHAM, JOSEPH, 1751–1815; b. Geo.; lieut.col. in the revolution. He was for two terms speaker of the Georgia assembly, and in 1795 Washington made him postmaster-general.

HABINGTON, WILLIAM, 1605–45; son of Thomas, a leading Roman Catholic, to whose wife was attributed the exposure of the gunpowder plot. William was educated first at St. Omer, and refusing to become a Jesuit, was removed to Paris. On his return to England he fell in love with lady Lucy Herbert, second daughter of lord Powis, whom he celebrated under the poetical name of "Castara." After some opposition he won her hand, and they were married about 1632. In 1634 he published his famous volume of lyrical poems entitled *Castara*, which was reprinted in 1635 and 1640. In the latter year he also published a prose *History of King Edward IV.*, and *The Queen of Aragon*, a tragi-comedy. This play was published at the request of his kinsman, the earl of Pembroke; it was afterwards revived by Samuel Butler. The last work printed by Habington was *Observations upon History*, 1641. In 1647 his father died; and during the commonwealth, as we learn from Anthony Wood, the poet, "did run with the times, and was not unknown to Oliver the usurper." Habington possessed all the faults of his age except its impurity; he is honorably known as the chastest of the royalist lyrists. His genius was very fantastic, mild in its play of fancy, delicately ingenious, and of an unruffled stately dignity. He never rises to sublimity or passion, but is always refined and often extremely graceful.

HABIT. This familiar word applies to a certain portion of our acquired powers or aptitudes. Common usage does not very closely define the kind or extent of acquisitions intended by it. Habits may be either intellectual or moral. We speak of a habit of talking or writing, as well as of a habit of early rising, or of truthfulness. The principle of the human constitution on which the growth of habit depends, when generalized to the utmost, may be called the power of *retentiveness*, or of plastic growth, and is one of the foundations of the intellect, inasmuch as memory and all the other intellectual faculties involve it in a greater or less degree. See INTELLECT, and ASSOCIATION OF IDEAS. Education of every kind must proceed upon this property, and should be conducted in conformity with its exact nature and laws. The maxims that govern the formation of habits are the same as the principles of mental acquirement in every shape. Some of the most important of these may be indicated here.

1. It should be understood, at the outset, that all persons are not alike susceptible of the growth of new powers, or of the process of education; nor is the same person equally susceptible as regards all subjects. The consequence is, that a much greater amount of practice is necessary in one case than in another; iteration being the mode of supplying the defective cohesiveness of the system.

2. However common the remark, that youth is the season for improvement, it may be doubted if we generally appreciate to the full degree the superior plasticity of early years, and the gradual decrease of the property as life advances. The as yet unoccupied state of the infant mind must be taken into account along with the very great energy of the principle of growth, which gives a firmness and security of hold to early impressions beyond everything that is communicated in later life. We see this in the impossibility of eradicating a provincial accent after one has grown to maturity; so the opinions and sentiments contracted in youth can seldom be changed in middle or advanced life.

3. In aquiring habits, the favorable disposition of the mind is of the greatest importance. Liking, taste, or predilection for the task concentrates all the energies of the

system upon the work, and favors to the utmost the cementing process. A strong natural liking will often compensate for want of natural aptitude, by making the most of what power there is.

4. In the default of natural liking for the subject, the attention may be secured to a certain extent by pains and penalties; but as these waste and enfeeble the powers of life altogether, there is a loss on the whole, although there may be a gain in the particular case. The education of the young cannot be conducted wholly on the principle of fascination; but if pain has to be frequently or systematically resorted to, no considerable general progress need be looked for.

5. Health, freshness, and vigor in the bodily system are conditions of the growth of habit. The brain may be powerful in a feeble body, but a certain co-operation of the other organs is necessary to the integrity of its functions; and when the stage of nervous exhaustion has been reached, there is nothing gained by continuing the exercise. After adequate rest and refreshment, the plastic property is at its height; there is a limit to what it can perform, which is marked by the approaching sense of fatigue; and at this point, the efforts in the way of learning should cease. The prevailing error hitherto has been to overrate this limit, and to keep up school exercises too long at one time. A short intermission enables the work to be resumed.

6. These observations apply to mental acquisitions generally. In the peculiar case of *moral* acquisitions—such as habits of fortitude, courage, contentment, honest dealing, obedience—some special considerations are applicable. In the first place, there must be a powerful *initiative*, or some influence strong enough to make a decided commencement and to keep up the desired conduct for a certain length of time. Either the coercion of some authority, or a powerful example, or an energetic resolution of the individual will, should induce the person to enter on the course prescribed, and to persevere until the plastic process, in other words, the power of habit, has had time to operate. The commencing stimulus may then be gradually withdrawn in favor of the self-sustaining force that iteration has engendered.

HABITA'TION, in the Roman law, meant a servitude by which a person could only use a house as a habitation or dwelling-house, and for no other purpose. In England and Scotland, such a restriction can only be produced by the operation of express covenants or stipulations in the lease.

HABIT AND REPUTE, a phrase used in Scotch law to denote something so notorious that it is taken without further proof to be true. The best known example of this is where a man and woman cohabit as husband and wife, and are reputed by the neighbors to be married, in which case the law of Scotland, with great liberality, assumes, as a positive and incontrovertible fact, that a previous marriage had taken place, and no evidence to contradict such a presumption, or legal fiction, is even allowed. In England, no such doctrine prevails, and the marriage would have to be proved in the usual way, if called in question, by a suit which directly raises such question, though the parties had all their lives lived together as man and wife.—There is also, in Scotland, an application of the doctrine of habit and repute to persons when convicted of stealing; for if the individual is a habit and repute thief—i.e., a notorious thief—his offense is greater and liable to a more severe punishment. In England, a somewhat similar effect is produced more circuitously, by proving after the trial that the thief had been several times previously convicted, in which case he is generally punished by a severer sentence.

HACHETTE, JEAN NICOLAS PIERRE, 1790–1834; a French mathematician. He became a deputy-professor at Mézières, and when the École Polytechnique was established, he was chosen on its staff, being appointed along with Monge over the department of descriptive geometry. There he instructed some of the ablest Frenchmen of the day, among them Poisson, Arago, and Fresnel. Accompanying Guyton de Morveau in his expedition, he was present at the battle of Fleurus, and entered Brussels with the French army. In 1816, on the accession of Louis XVIII., he was expelled from his chair by government, at the same time that his friend and fellow-worker Monge was removed from the institute. He retained, however, till his death the office of professor in the faculty of sciences in the École Normale, to which he had been appointed in 1810—the same year in which he married the daughter of the physician Maugras. The necessary royal assent was in 1823 refused to the election of Hachette to the academy of sciences, and it was not till 1831, after the revolution, that he obtained that well-merited honor. Hachette was held in high esteem for his private worth, as well as for his scientific attainments and great public service. His labors were chiefly in the field of descriptive geometry, with its application to the arts and mechanical engineering.

HACK'BERRY. See NETTLE TREE.

HÄCKEL, or HAECKEL, ERNST HEINRICH; b. Germany, 1834; studied botany and medicine, and has devoted much attention to biology. He is professor of zoology at Jena. He was among the first of German writers to agree with Darwin, and is one of the foremost leaders in that school of biologists. He has published several works on biological themes, in which he has advanced some interesting theories of his own.

HACKETT, HORATIO BALCH, D.D., LL.D., 1808–75; b. Mass.; studied theology at Andover and in Germany; was professor of Latin in Brown university, professor of literature in the Newton theological institution, and of New Testament Greek in Rochester theological seminary. Among his publications are a Chaldee grammar, a Hebrew grammar, *Commentary on Acts; Philemon* (with notes); *Christian Men in the War;* and several translations.

HACKETT, JAMES HENRY, 1800–71; b. New York; an actor who first appeared on the stage in 1826, and rapidly earned a prominent position, especially in eccentric parts. Among his impersonations best known were *Justice Woodcock; Sylvester Daggerwood; Mons. Morbleu; Dromio; Rip Van Winkle; Nimrod Wildfire; Sir Pertinax McSycophant;* and far beyond all others, *Falstaff;* in which he had no compeer. He played with much success in England, and in all parts of the United States. He was one of the lessees of the Astor place opera house at the time of the Forrest-Macready riot.

HACKETTSTOWN, a village in Warren co., N. J., on the Musconetcong river, and the Delaware, Lackawanna and Western railroad (Morris and Essex division), 52 m. w. of Newark; pop. 2,800. It is the seat of the centenary (Methodist) collegiate institution, and has a number of important manufactures.

HACKLÄNDER, FRIED. WILH., a popular German poet, was b. at Burtscheid, near Aix-la-chapelle, Nov. 1, 1816. After several vicissitudes, he proceeded to Stuttgart, where he commenced his literary career with *Bilder aus dem Soldatenleben im Frieden*, which appeared in the *Morgenblatt*, and has since been translated into several languages. The truth and pleasant humor of this little book attracted the attention of baron von Taubenheim, who invited Hackländer to accompany him on his travels to the east. The literary fruits of this journey were *Daguerreotypen, aufgenommen auf Einer Reise in den Orient* (2 vols. Stuttg. 1842; 2d edit. 1846), and the *Pilgerzug nach Mekka;* a collection of oriental tales and legends. At a later period he published *Wachtstuben-abenteuer* (a continuation of the *Soldatenleben*), *Märchen*, and a variety of smaller works. In Mar. 1849, he went to Italy, was present in the campaign in Piedmont, and afterwards published his *Soldatenleben im Kriege* (2 vols. 1849–50). In 1849 he married and settled near Stuttgart, where he has since published several humorous romances: *Handel und Wandel* (2 vols. 1850), *Eugene Stillfried* (3 vols. 1852), *Namenlose Geschicten* (3 vols. 1851), etc. Hackländer has been styled the German Dickens. His comedy entitled the *Geheimer Agent* has been performed on all the stages of Germany, and translated into Hungarian, Polish, and English. His *Magnetische Curen* was a success. Other works of his are *Ein Winter in Spanien* (1855); *Der neue Don Quixote* (1858); *Künstlerroman* (1866); *Zwölf Zettel* (1867); *Das Geheimniss der Stadt* (1868); the play *Die Marionetten* (1868); and *Kainszeichen* (1874).

HACKEL, or HATCHEL. See HECKLES, *ante.*

HACK'MATACK. See LARCH.

HACK'NEY, the name of a parish of England, in the co. of Middlesex, which now forms a suburb of London, and is 3 m. n.n.e. of St. Paul's. It was at one time a favorite suburban residence of the London citizens, but the current of fashion having for many years been setting to the west, Hackney no longer holds the rank it formerly did. In its earlier and fashionable days, it is said to have given its name to hackney-coaches.

HACKNEY-COACHMEN differ in no respect from other carriers, except that in addition they are generally put under police regulations in all the towns and cities of the United Kingdom, and a tariff of fares imposed upon them. They require a license from the town-council or other similar body, and must conform to the regulations imposed by this authority. In London acts of parliament have been passed to define these regulations, and the legal fare is fixed at 6d. per mile, or part of a mile. In other cities and towns, the legal fare is higher.

HADAD, the name in Scripture of a Syrian deity. The divinity primarily denoted by the name is, according to Philo of Byblos, the king of gods, the greatest and highest, the sun. The Syrian kings of Damascus seem to have habitually assumed the title of Benhadad, or son of Hadad (three of this name are mentioned in Scripture), just as a series of Egyptian monarchs are known to have been accustomed to call themselves sons of Ammon-Ra. The word Hadadrimmon, for which the inferior reading Hadarrimmon is found in some MSS., in the phrase "the mourning of (or at) Hadadrimmon," has been a subject of much discussion. According to Jerome and all the older Christian interpreters, the mourning for what occurred at a place called Hadadrimmon (Maximianopolis) in the valley of Megiddo is meant, the event alluded to is generally held to be the death of Josiah; but since Hitzig and Movers the opinion has been gaining ground that Hadadrimmon is merely another name for Adonis or Thammuz, the autumn sun-god, the allusion being to the mournings by which the Adonis festivals were usually accompanied.

HAD'DINGTON, a market t. and royal and parliamentary borough of Scotland, capital of the co. of the same name, is situated at the foot of the Garleton hills, on both sides of the river Tyne, about 16 m. e. of Edinburgh. The old abbey church, a fine Gothic

structure, in partial ruin, and situated close to the banks of the river, is the most interesting object in the town. John Knox and George Wishart preached in this church. Among the other principal buildings may be mentioned the corn exchange, necessarily a very commodious building, Haddington being one of the largest grain-markets in Scotland. The inhabitants are chiefly dependent upon agriculture, but there are nurseries, corn-mills, breweries, tanneries, etc., in the town and vicinity. Haddington unites with North Berwick, Dunbar, Jedburgh, and Lauder in sending a member to parliament. Pop. '71, 4,007.

HADDINGTONSHIRE, or EAST LOTHIAN, a maritime co. in Scotland, lying between n. lat. 55° 4′ and 56° 5′, and w. long. 2° 25′ and 3° 2′, is bounded on the n. and e. by the Firth of Forth and the German ocean, s. and s.e. by Berwickshire, and on the w. by Midlothian. The extreme length is about 25 m., and breadth about 17; area, 179,142 acres, or 280 sq miles. In the s. of the county are the Lammermuir hills, rising to the height of 1732 feet. In the n. and n.e. is a strip of level ground of unequal breadth, composed of clay and loam, and mostly very productive for all kinds of crops. The climate is excellent on the lower grounds, and the rainfall much under the average. There are few streams of any considerable size, the principal being the Tyne, which flows n.e. across the county into the sea at Tyningham. East Lothian has long enjoyed high agricultural fame. John Cockburn of Ormiston, who is regarded as the father of improved Scottish husbandry, and who was born in this county in the end of the 17th c., was the first to test its capabilities. This enterprising man gave long leases, and encouraged his tenantry to lay out their farms in regular inclosed fields. He introduced the culture of turnips, rape, and clover; and turnips in drills were sown on one of his farms as early as 1725, and brought to such perfection in ten years thereafter, that a specimen of a turnip, weighing 35 pounds, was sent for public exhibition to Edinburgh. Potatoes were also first planted in the fields in 1734 at Ormiston. Pennant says that hedges round fields were first planted in this county, and here the thrashing-machine was first introduced, in 1786, by a native, Andrew Meikle. In Sept., 1862, the first steam-plow possessed by a tenant-farmer in Scotland was introduced into this county by Mr. Sadler, Ferrygate. The well-known varieties of wheat, Hunter's, Hopetoun, Fenton, and Shireff's bearded, all originated in Haddingtonshire.

According to the agricultural statistics taken in 1876, the total number of acres under rotation of crops was 113,615. There were 8,879 acres under wheat; 17,202 under barley; 16,296 under oats; 1,342 under beans; 9,345 under potatoes; 15,899 under turnips; and 26,451 under clover, sanfoin, and grasses under rotation. The number of draught and other horses was 3,727; cattle, 7,072; sheep, 108,447; swine, 2,790. On comparison with the other Scotch counties, it will be found that there are only two with a greater acreage of wheat and potatoes, 4 with more barley, and 12 with more turnips; while in yield per acre Haddingtonshire occupies a very high position, particularly in its crops of oats. The land rental, exclusive of railways, in 1876–7 was £304,312; railways, £26,237. Old valuation (1674), £14,072. Coal and limestone are abundant. The former was wrought in the 13th c., the earliest recorded in Scotland. Haddingtonshire returns one member to the house of commons; its parliamentary constituency in 1876–77 was 939. Pop. '71, 37,771.

Historical interest is confined almost entirely to the battle-field of Dunbar, where Cromwell defeated the covenanting army in 1650; and Prestonpans, where the pretender defeated the royal troops in 1745. Among the antiquities may be named the ruins of the castles of Tantallon, Dirleton, Luffness, Hailes, and Innerwick. The principal towns are Haddington, Dunbar, and North Berwick.

HADDOCK, *Gadus* or *Morrhua æglefinus*, a fish of the same genus with the cod, and much resembling it in general appearance. The number of fins is the same as in the cod, there being three dorsals and two anals. The haddock, like the cod, has a barbule at the point of the lower jaw. The haddock is brown on the back, silvery on the belly; the lateral line is black, and there is a black spot behind each of the pectorals, these spots sometimes extending so as to meet on the back. A ridiculous legend ascribes these spots to the finger and thumb of St. Peter, and states the haddock to be the fish from the mouth of which he took the tribute money, "the inventors of the legend never adverting to the improbability of a marine fish living in the fresh-water lake of Gennesaret." The haddock, indeed, is not even found in the Mediterranean. Nor does it enter the Baltic, although plentiful in the northern parts of the Atlantic ocean, both on the European and the American coasts. On the British coasts it is abundant almost everywhere, appearing in great shoals at particular seasons, but in size and quality the haddocks taken at one part of the coast differ much from those of another. Those of the e. coast, and particularly those caught in deep water, are in great esteem, and those of Dublin bay are remarkable for their large size. A haddock of 16 lbs. has been taken in Dublin bay. Generally, however, this fish is much smaller. It is taken both by trawl-nets and lines. Pieces of the herring and sand-eel are most attractive baits. The haddock, when really of good quality, is perhaps the finest of all the *gadidæ;* and the numbers taken on some parts of the British coasts are very great, rendering it, in an economical point of view, a very important fish. It does not "take salt" so well as the cod, but is often cured by drying and smoking. In Mar. and April

the haddock is out of season; in Oct., Nov., Dec., and Jan., it is in finest condition. *Finnan haddocks* and *bervies* are well known, particularly in the Scottish markets.

HADDOCK, NORWAY, an ocean fish of the mailed-cheek kind or family; from 12 to 24 in. long; the body and the upper side of the head covered with stiff scales. It is of a bright red color when living, but after death turns partially white. It is often called the snapper, rose fish, or red perch. It is abundant off Newfoundland. Greenlanders make needles of its spines.

HADDOCK, CHARLES BRICKETT, D.D., 1796—1861; b. N. H.; graduated at Dartmouth and studied theology at Andover. He was prof. of rhetoric and *belles-lettres* in Dartmouth for 19 years, and of intellectual philosophy and political economy for 16 years. In 1850 he was U. S. minister at Lisbon. He was several times chosen to the New Hampshire legislature and was the chief promoter of the common school system of the state. He was equally prominent in advancing railroads. Many of his addresses and reports have been published.

HA'DERSLEBEN, or HADERSLEV, a t. of the German empire, in the n. of the province of Sleswick-Holstein, on the Hadersleben fiord, a narrow arm of the sea, stretching inland westward from the Little Belt, 33 m. n. of Flensborg. The church of St. Mary is a large and handsome edifice. Hadersleben has a port for small vessels; and a gymnasium. Pop. '75, 8,362. Hadersleben, which formerly belonged to Denmark, received its town-rights from Waldemar II., in 1292; and here, in 1448, count Christian of Oldenburg was elected king of Denmark, and began the present dynasty.

HA'DES, in Greek mythology, was the god of the lower world, more commonly spoken of as Pluto (q.v.); the name was also applied to his kingdom, the abode of the departed spirits or shades. See GREEK RELIGION, also HEAVEN and HELL.

HADJI. See HAJJ, *ante.*

HADES (*ante*), a Greek word signifying literally *unseen*, was employed by the classic writers to denote the region of the dead which, as they believed, was in part the wretched prison of the wicked, and in part the elysian abode of the blessed. In the Greek translation of the Old Testament it is used as the equivalent of the Hebrew *sheōl* which denotes the region of departed spirits, sometimes without referring to any separation between the righteous and the wicked; and at other times marking the separation clearly. While the Greeks and the Jews were so far agreed concerning the abode of the dead, there was one great difference between them. The former had no hope of deliverance from *hades* as they had no faith in a resurrection. But among the Jews the expectation of a resurrection was the chief comfort in connection with death. The ancient believers, it is said, looked for a heavenly country and for the city which God had prepared. The Psalmist said, in his expression of confidence in God, "Thou shalt guide me by thy counsel and afterwards receive me to glory." The prophecies of Isaiah, Hosea, and Daniel, contain promises of a resurrection. These and similar declarations gave the Jews a hope concerning the future state, that heathen nations did not possess. In the New Testament the Savior's use of the term is of paramount importance. On one occasion, in declaring the consequences that would follow Capernaum's neglect of its privileges, he contrasted *hades* with *heaven*. At another time, with reference to the welfare of his church, he promised that the gates of hades should not prevail against it. In the parable of the rich man and Lazarus he represents the former as tormented after death, in hades, and the latter as happy in the society of the blest, a great gulf being fixed between the two. After his ascension to heaven, appearing in vision to the apostle John, he affirmed that he himself had the keys of hades and of death; and revealed to him the casting of them both into the lake of fire. To the question, Was Christ in hades during the interval between his death and resurrection? some reply, 1. That the apostle Peter taught that he was, in applying to him Psalm xvi, "Thou wilt not leave my soul in hades, neither wilt thou suffer thine holy one to see corruption." This implies (they say) that, for a time, his soul was in hades but returned from it before his body was in any degree changed. The answer to this is that the apostle quoted the Greek translation which conveys the general meaning but will not bear any emphasizing of the preposition "in." The Hebrew original, "Thou wilt not forsake or abandon my soul *to* sheol," clearly expresses the idea that his soul would not even enter it. 2. The same apostle is appealed to again as confirming the construction put on his quotation by teaching in his first epistle that Christ went and preached to the spirits in prison, that is in hades. To this the answer is that though the spirits referred to were in prison when the apostle wrote, Christ's preaching to them had been before his incarnation during the divine forbearance in the days of Noah. 3. The apostles' creed (it is said), declares that Christ, after his death, descended into hades. To this the answer is that the creed, with all its excellences, is not known to be the work of apostles; and that, while all the rest of it can be traced back at least to the 3d century, the clause, "he descended into hades," was not in it even at the beginning of the 5th, (nor has the Nicene creed, adopted 325 A. D., any such clause). Therefore, as it was added at so late a period when erroneous views of various sorts had become common, the clause has no claim to be believed merely because it is in the creed. Our knowledge concerning the place in which the human soul of Christ rested during the period referred

:o, is limited by his promise to the penitent thief, "This day shalt thou be with me in *paradise*;" and by his subsequent invocation to the Father, "Into *thy hands* I commend my spirit." Besides the use of the word *hades* by the Savior and with reference to him, it occurs in the New Testament only in Paul's apostrophe, "O grave, where is thy sting? O hades, where thy victory?"

HADITH (something new, a story, legend, tale; emphatically, Hadith Ar-Rassul), the traditions about Mohammed the prophet's sayings and doings, which, as a complementary to the Koran, form, together with it, the supreme authority for all religious and legal questions of the Mohammedans. Originally, it was not allowed to commit them to writing (like the Mishnah, q. v.), but the danger of their being entirely forgotten in the course of time, led to their being written down in the first centuries after Mohammed. Those who, notwithstanding, know them well by heart are honored with the title of Hafiz (retainer, keeper). The six principal sources for these traditions are Ayeshah, after the death of Chadija, the prophet's favorite wife; Abu Hureira, his constant companion and servant; Abdallah Ibn Abbas; Abdallah bnu Omar b. Al-Ass; Djaber b. Abdallah Ansari; and Ans b. Malik. The principal and most authoritative collections of traditions are those of Bochari, Malik, Abu Dhaud, Tarmesi, Nissai, Moslem, and Sojuti. Of these, again, the most important code is the *Sahih* of Bochari, who, it is said, spent sixteen years of his life in traveling through the length and breadth of the land for the purpose of collecting such traditions, and who singled out, from a number of 60,000, about 7,270 as alone genuine. This code was printed for the first time with commentaries (Delhi, 1848—1854), of which only three copies are to be found in Europe —one is at present in the British Museum; and another edition (by Krehl, in Leyden) has been published. See SUNNA, MOHAMMED, MOHAMMEDANISM.

HADJI KHALIFAH, the surname of MUSTAFA-BEN-ABDALLAH, a celebrated Turkish historian, who was b. at Constantinople about the end of the 16th c., and died in Sept., 1658. From 1622 till 1633 he was employed in the Turkish army, and had an excellent opportunity of acquiring information regarding matters of history, geography, etc., of which he eagerly availed himself.

Hadji's works are written in Turkish, Arabic, and Persian. Besides a number of smaller works on geography and history, we have the celebrated *Asam al-kolouh ve al-fonoum* (Names of Books and Sciences), written in Arabic, and of which Flügel has given a translation with the text under the title *Lexicon Bibliographicum et Encyclopædicum a Mustafa-ben-Abdallah* (Leip. 1835–58, 7 vols). There is also a French translation, by Petis de la Croix (1694–1705), which is to be seen in MS. in the imperial library. In this work Hadji gives a definition of each science and the principal writers on each; specifies the titles, contents, language, dates of composition, and translations of more than 25,000 works; also the names of the authors and dates of their death. It is the most complete catalogue in existence of works written in Arabic, Persian, and Turkish; *Tarikh Kebir* (Great History), a history of the world from the creation of Adam to 1655, containing notices of 150 dynasties, principally Asiatic; also a history of the Ottoman empire from 1591 to 1658; and a history of the maritime wars of the Turks, which has been translated into English (Lond. 1831).

HADLEY, a village in Hampden co., Mass., on the Connecticut river, 18 m. n. of Springfield; pop. township, 2,125. This ancient village is the seat of the Hopkins academy, and has considerable manufacturing industry. It is in the midst of charming meadow scenery fringed with mountains.

HADLEY, JAMES, 1821–72; b. New York. An accident in boyhood made him hopelessly lame, and gave him an impulse of study, and he soon became distinguished in his knowledge of ancient languages. He graduated at Yale, first in his class, and was tutor in Middlebury college and afterwards at Yale. He passed through the theological course at New Haven, but did not enter the ministry, becoming assistant professor of Greek in Yale college in 1848, and in 1851 professor, and continuing in that chair till his death. He was very efficient personally as a teacher, and was also one of the most eminent linguists of his time, being familiar with Sanskrit, Hebrew, Greek, Latin, Arabic, Gothic, Armenian, and several modern languages, including Welsh and Swedish, and early forms of English. He was the author of the *History of the English Language* in the introduction to Webster's dictionary. He was an able student of comparative philology, and vice-president of the American philological association. He was also a member, and in 1871–72 president of the American oriental society. He was a member of the American committee for the revision of the English version of the New Testament, and wrote the article on the *Language of the New* in Smith's *Dictionary of the Bible*. He also wrote an essay on the Greek accent which was republished in Curtius's *Studien zur griechischen und lateinischen Grammatik*. He published *Lectures on Roman Law*, *Elements of the Greek Language*, and a Greek grammar very widely used; and after his death a volume of his writings, entitled *Essays Philological and Critical*, was edited by prof. W. D. Whitney.

HADLEY, JOHN, an English mathematician, the intimate friend of Newton, from whom, as is now generally supposed, he borrowed the idea of the instrument called Hadley's quadrant (see SEXTANT). In 1717 he became a member of the royal society,

before which he read some useful papers, which were afterwards published in their *Transactions*. The honor of having invented the sextant is claimed by their supporters for Hadley, Godfrey, and Newton; for Hadley, because he was the first to construct the instrument and give a description of it, which he did in 1731, before the royal society; for Godfrey, because, in 1730, he presented a gentleman in Philadelphia, U. S., with a description of the instrument almost coinciding with Hadley's, which description was transmitted to the royal society in 1732; and for Newton, because he, in 1727, gave a description of the instrument to his friend Hadley, who, for some reason unknown, suppressed it, and it was not till after his death in 1742 that it was discovered. The royal society decided that Godfrey and Hadley were both entitled to the honor of the invention, and accordingly each received a reward of £200. He died Feb. 15, 1744.

HADRAMAUT, a large district of Arabia, next to Yemen, lying along the Indian ocean 1200 m. from Aden to cape Ras-el-Hadd. This coast has been visited and partially explored by capt. Wellsted and other navigators. It presents everywhere much the same dreary appearance as that of the Hejaz and Tehamah—a narrow fringe of sand or of equally sterile shore; beyond this rises a mountain range, varying, so far as any tolerably accurate calculations have been made, from 1000 to 3,000 ft. in height; its formation appearing to be in many places volcanic. Behind this comes a second and loftier mountain belt, Jurassic in its general character, resembling the highlands of Yemen; while far beyond stretches away the great sandy desert, varied, however, where it approaches the mountain-foot, by oases of considerable fertility, among which that of Wadi Doan is said to be the most extensive. Several barren islands and reefs fringe the waste. The mountains of Hadramaut form one system with those of Yemen, but, unlike the latter, seem to be of an almost monotonous sterility. Torrents descend from them, but no rivers; nor though lakes are mentioned in the very apocryphal records of the Arabs, has any signs of their existence been verified. The climate is intensely hot, and said to be unhealthy, at least to strangers. Vegetation is scanty. No part of the peninsula has been less explored than this, even by the orientals themselves; and European travelers have supplied few reliable data for what regards the physical characteristics of the interior, any more than its inhabitants and products.

HADRIAN, WALL OF. See ROMAN WALL.

HADRIA'NUS, P. ÆLIUS, a Roman emperor (117–138 A.D.), was b. at Rome, Jan. 24, 76 A.D. During the reign of Trajan, who was his guardian, and with whom he was connected by marriage (his father, who was a Roman senator, having married the aunt of Trajan), he filled several high offices in the state. He accompanied the emperor in his wars against Decebalus, where he distinguished himself by his bravery; and in 117, when Trajan set out on his return to Italy, he was left behind with the army as governor of the province of Syria. When the intelligence reached Antioch that Trajan had died in Cilicia on his journey home, Hadrianus was proclaimed emperor by the army, Aug. 11, 117 A.D. The state of the empire at the time was extremely critical. Insurrections had broken out in Egypt, Palestine, and Syria; Mœsia in the east, and Mauritania in the west, were both invaded by barbarian hordes, while the Parthians had once more asserted their independence, and won several successes over the imperial forces. Hadrianus, perceiving the advantage of a peaceful policy, wisely resolved to limit the boundaries of the Roman dominion of the east, and concluded a peace with the Parthians, surrendering to them all the country beyond the Euphrates. In 118 he repaired to Rome (where he had been acknowledged by the senate), established his authority by liberality towards the people, and suppressed with great severity a patrician conspiracy against his life. The Roxolani (modern Russians), who had made an inroad into Mœsia, were induced to retire by large gifts. In the year 119, for the purpose of becoming acquainted with the state of the provinces, he commenced his celebrated journey, which he is said to have performed chiefly on foot. He visited Gaul, Germany, Britain (where he built the famous wall extending from the Solway to the Tyne), Spain, Mauritania, Egypt, Asia Minor, and Greece, whence he returned to Rome, 126 or 127 A.D., and received the title of *pater patriæ*. Hadrianus spent the years 132 and 133 in Athens, for which city he had a great predilection. After once more visiting Syria, he returned to Italy, and spent the last years of his life at Rome and Tibur. During the severe illness which carried him off July 10, 138, at Baiæ, he was subject to violent outbursts of cruelty, to which, as well as to jealousy and pleasure, he was naturally addicted. After the death of Lucius Ceionius Commodus, whom he had adopted under the name of Lucius Ælius Verus, he appointed Titus Aurelius (afterwards the emperor Antoninus Pius) his successor. During his reign the army was vigorously disciplined and reorganized, so that the barbarians were not likely to attribute Hadrianus's conciliating and peaceful policy to fear or weakness. As a civil ruler, he merits high praise, particularly for the just and comprehensive view he appears to have taken of his duties as a sovereign. Hence to him is attributed, more than to any other, the consolidation of the monarchical system of Rome. Hadrianus also divided Italy into four parts under four consuls, to whom was intrusted the administration of justice. Hadrianus erected numerous splendid edifices, the chief of which were—the mausoleum called the *Moles Hadriani*, in Rome (the groundwork of the modern castle of St. Angelo), the Ælian bridge leading to it, and the magnificent villa at Tibur. He like-

wise laid the foundation of several cities, the most important of which was Adrianopolis, Hadrianus was a lover of the fine arts (in the history of which, as well as of jurisprudence, his reign forms an important era), of poetry, philosophy, and rhetoric, all of which he attempted. He set a high value on Greek literature, and likewise on the cultus of Greece, and caused himself to be initiated into the Eleusinian mysteries.

HADROSAURUS, a genus of extinct gigantic reptiles of the order DINOSAURIA (q. v.) according to the classification of Huxley. The general characteristics of the *dinosaurs* are: they were sometimes naked, but were usually covered with a well-developed exo-skeleton, consisting of bony shields resembling those of the crocodile; anterior trunk ribs, double headed; teeth confined to the jaws, and implanted in distinct sockets; always two pairs of limbs, strong, and furnished with claws; but the most remarkable feature in their organization was the structure of the pelvis and hind limb, which approximated to that of the same parts in birds. All the genera of the order DINOSAURIA belong exclusively to mesozoic time, ranging from the triassic to the cretaceous periods, but particularly abounding in the oölitic, and lower and middle cretaceous epochs. The number of dinosaurian reptiles was very large, and represented by many genera, among which, beside hadrosaurus, are the *iguanodon* (q. v.), *cionodon, chondrosteosaurus, cetiosaurus, laosaurus, megalosaurus* (q. v.), and *titanosaurus* (q. v.). Hadrosaurus much resembled the *iguanodon*, but was rather smaller, the largest species being about 30 ft. long, while the *iguanodon* was probably over 40 feet. Like the *iguanodon*, the hadrosaurus fed upon vegetable substances, such as shrubs, leaves, etc. Among the species may be mentioned *hadrosaurus foulkii*, from New Jersey, about 28 ft. long; *hadrosaurus minor*, about half as long; and *hadrosaurus agilis*, from Kansas (Marsh).

HADRUMETUM, a city on the African coast of the Mediterranean on the gulf of Hammamet. A Phenician colony of earlier date than Carthage, in course of time it became subservient to the imperial city, and fell along with it under the power of the Romans. On the subdivision of the Roman province of Africa Propria, it became the capital of Byzacium. By Trajan it was made a colony, as is evinced by the grandiloquent inscriptions preserved by Gruter—*Col. Concordia Ulpia Trojana Augusta Frugifera Hadrumetina.* From the devastation inflicted by the Vandals, it was restored by Justinian, and in consequence it bore for some time the name of Justinianopolis.

HAECKEL. See HÄCKEL.

HÆMA—in compound words. See HEMA—in compound words.

HÆMATO'XYLINE is a chromogen (a term used by chemists to denote certain nearly or quite colorless substances which, under certain influences, yield well-marked colors) obtained from logwood (*hæmatoxylon campeachianum.*) Its composition is represented by the formula $C_{32}H_{14}O_{12} + 6aq.$, and in its pure state it occurs in transparent glistening straw-colored prisms. It has a sweet and not astringent taste, is sparingly soluble in cold water, but dissolves readily in boiling water, alcohol, and ether. The watery solution is not affected by the oxygen of the air, but if a very small quantity of ammonia is added, it assumes an intensely reddish purple color.

Hæmatoxyline is obtained by mixing powdered extract of logwood with quartzose sand (to prevent its agglomeration into lumps), and digesting this powder for several days with about six times its volume of ether. The liquid is then distilled till the residue assumes the consistence of a sirup. If this residue is mixed with water, crystals of hæmatoxyline are in a few days deposited, which on an average weigh about one-eighth of the extract that was employed.

The color reactions of this substance with metallic compounds are singular, and in consequence of the tinctorial power of some of them, deserve a brief notice. Solution of acetate of lead gives with one of hæmatoxyline a white precipitate, which speedily becomes blue; salts of copper give a dirty green precipitate, which also soon becomes blue; chloride of barium produces a red precipitate; protochloride of tin gives a rose-colored, and iron alum, a scanty blackish precipitate.

The purple color which the solution of hæmatoxyline assumes if oxygen and ammonia are present, is due to a decomposition, of which a substance termed *hæmatein* is one of the products; the compound resulting from the union of hæmatein and ammonia possessing this tint.

The solution of hæmatein-ammonia (or hæmateate of ammonia, as some chemists have termed it) yields colored precipitates with many metallic salts; with acetate of lead, it gives a deep blue, with sulphate of copper, a violet blue, with protochloride of tin, a violet, and with iron alum, a black precipitate.

It is upon the various reactions which have been described in the preceding paragraphs that the value of logwood as a dye depends.

HÆMO—in compound words. See HEMO—in compound words.

HÆMUS, MOUNT. See BALKAN.

HÆRE'DITAS JA'CENS, in Scotch law, means the heritable estate which a deceased person has left, as it remains before the heir has made up a title to it, and when therefore the property lies to a certain extent in abeyance. When a creditor of the deceased wants to recover his debt, he was formerly compelled by a circuitous process first to

compel the heir to complete his title, or declare his refusal to do so; but now, by the titles to land (Scotland) act, 31 and 32 Vict. c. 101, he merely raises an action in the usual way, and obtains a decree of adjudication, under which he can help himself to the property. The expression of hæreditas jacens is not used in England, where similar niceties of feudal conveyancing have long been extinct.

HÆRE'TICO COMBUR'ENDO, an old writ in English ecclesiastical law for burning a heretic, now abolished by 29 Chas. II. c. 9.

HAFF, a word now obsolete in current German, signifies, in the Danish language, the sea, or a considerable portion of the sea. In German, it occurs as only the proper name of three estuaries of peculiar form on the southern coast of the Baltic—viz., the Stettin haff (q.v), the Frisches haff (q.v.), and the Kurisches haff (q.v.). Haff-fishing is a term used by the inhabitants of Shetland to signify sea-fishing.

HAFIZ (one who knows the Koran and the Traditions by heart), MOHAMMED, SHAMS-AD-DIN (sun of religion), also called LISHAN-AL-GHAID (voice of mystery), an eminent Persian divine, philosopher, and grammarian, and one of the greatest poetical geniuses of all times. He was born in the beginning of the 14th c. at Shiraz, and early applied himself to the pursuit of science and learning. His proficiency in various branches of knowledge brought him under the notice of the then reigning house of Muzaffer, and he was not only appointed teacher in the royal family, but a special college was founded for him. His spirit of independence, however, stood in the way of his worldly advancement, and notwithstanding many offers of princely favor, he remained during his whole life in the humble condition of a dervish. The burden of his poetical compositions is for the most part wine, love, nightingales, flowers—in fact, beauty in every form; occasionally also the praise of Allah and the prophet, and reflections upon the instability of life and its joys; through all of them, there runs, however, a withering contempt of all professional piety, mock-humility, and sanctified abhorrence of the good things of this world. These poems are of such exquisite sweetness, that the poet has also received the name of *Tschegerleb* (Sugarlip); and his contemporaries speak of his having drunk from the fountain of life, a draught of which was brought to him, in reward for his untiring perseverance in study, and his power of self-abnegation, by Zikhr (the Mohammedan Elijah) himself. No less remarkable are the sudden and striking transitions in his writings, and the readiness of wit which he displayed on several noticeable occasions during his lifetime.

Hafiz was married, and appears to have reached a happy old age. The time of his death is uncertain, the dates being variously given between the years 791 H. (1388 A.D., the date on his tombstone), and 797 H. (1394 A.D.). The enmity, however, which had been provoked in the breasts of the zealous defenders of religion by the freedom of his manners, and his more than Sufistic contempt for the outward forms of godliness, broke out undisguisedly at his death. The ministers of religion refused to repeat the usual prayers over the dead body, and after long altercations between the members of his family and his enemies, it was agreed that the question, according to the usual customs of the east, should be decided by lot. The result was favorable; whereupon he was buried with great honor. His tomb, situated about 2 m. to the n.e. of Shiraz, has been adorned with the greatest sumptuousness by princes and nobles, and is still resorted to by pilgrims from all parts of Persia. It has been visited and described by Kæmpfer, Pietro della Valle, Chardin, Le Bruyn, Scott Waring, W. Franklin, Ouseley, and others.

How far some of the odes of Hafiz are *bonâ fide* productions of a most licentious nature, or are intended as an allegorical and mystical revelation of things divine in the manner of Sufism (q.v.), as is declared by Hafiz's pious admirers, is a question which has at different times been raised before ecclesiastical and critical courts. A style brilliant, yet clear—imagery gorgeous, yet clothed in pure and unaffected diction—undulating melody and classical harmony, are the chief characteristics of Hafiz's anacreontic lyrics, which have not only become the national poetry of his country, but are even appealed to as an oracle on most important questions of peace and war. The number of their commentators is legion; the most valuable notes, however, are those of Shemii, Sururi, Sudi. The *Divan* was first collected by Said Kasim Anvari, after the death of the poet. Lithographed and printed editions of Hafiz have been published at Calcutta (1790 and 1826), at Bombay (1828–50), at Cawnpore (1831), Bulak (1834 and 1840), Constantinople (1841), etc. A very valuable edition by H. Brockhaus was published at Leipsic in 1854–61. Of translations in European tongues, we may mention those of Rewitzki in Latin (Vienna, 1771); Richardson, Jones, Ouseley, Hindley, Rousseau, Bicknell (1876) in English; and by Hammer-Purgstall and Daumer, in German.

HAG (*myxine* or *gastrobranchus*), a genus of cartilaginous fishes, allied to lampreys, and with them ranked among dermopterous fishes by Owen. The fishes of this genus are of low organization, and seem to connect fishes with cephalopodous mollusks. The vertebral column is reduced to a mere flexible cartilaginous tube, nor are there any other bones. The shape resembles that of an eel or worm, and Linnæus placed these animals among the *vermes*. The mouth is formed by a mere membranous ring, with a single tooth on its upper part, whilst the tongue is furnished with two rows of strong teeth, and also performs the office of a piston in the use of the mouth as a sucker. Around the mouth are eight barbules or cirrhi, which have been regarded as analogous

to the tentacles of the cuttle-fish, and are apparently the principal special organs of sensation. There are no eyes. There are six gill-bags on each side, receiving streams of water from the gullet (*œsophagus*) by as many tubes, the water being admitted to the gullet by an aperture situated rather on the left side, and carried off by a canal which opens about the end of the first third of the length. The tail is surrounded by a narrow fin. The skin is smooth and very unctuous.—One species, the GLUTINOUS HAG (*M. glutinosa* or *G. cæcus*), is found in the British seas, and is more common on the coast of Norway, where it is an object of dislike to fishermen, as they believe it to enter by the mouths of haddocks and other fishes caught in their lines, and to prey upon them so as to reduce them to mere skin and skeleton. A fish which has been thus treated is called a *robbed fish*. Six hags have been taken out of a single haddock. The hag is also said to make its way into fishes through their skin, and is therefore sometimes called the *borer*. Some suppose, however, that hags are swallowed by the fishes on which they afterwards prey. The glutinous hag attains a length of 12 to 15 in., and exudes a mucous fluid, which soon turns into a kind of jelly. It is of a dark-bluish brown color above, and whitish beneath. The quantity of mucus which it exudes is so great that a single hag, confined in a jar of water, soon turns it all into a kind of jelly. The mucus is exuded from lateral pores.

HAGAR (LXX. *Agar*), Gen. xvi. ff., an Egyptian bondwoman of Sarah. This her Semitic name (the Egyptian is unknown) has been derived from various roots, and has been translated accordingly—"slender," "stranger," and "flight" (in allusion to her after-life). Sarah having remained barren up to a very advanced age, at last gave Hagar to Abraham, ten years after his sojourn in Canaan, as a concubine—according to the eastern custom—in the hope of being "edified through her," i.e., establishing a family of her own. Hagar bore Abraham a son, whom he called Ishmael (God has heard), and in whom he for a time saw the future father of the progeny promised him. But 16 years later, and when Abraham was (we are told) a 100 years old, Sarah herself bore Isaac; and we find it significantly repeated nine times in seven verses (Gen. xxi. 2—9) that Abraham and Sarah were his parents—in repudiation, according to rabbinical authorities, of certain rumors about Isaac's illegitimacy, spread by Hagar. At last the domestic contentions that naturally arose led Abraham, though reluctantly, to cast out Hagar together with Ishmael. How the two fugitives lost their way in the desert of Beersheba; how the water in the bottle being spent, the broken-hearted mother set herself at a distance from her child, in order that she might not see his death; how her weeping and the loud voice of the boy were answered by an angel, who pointed out a well (Temzem, in the inclosure of Mecca)—all this forms one of the most touching and well-known narratives of the Bible.

In the New Testament, Hagar is referred to allegorically as Mt. Sinai or "the Jerusalem which now is" (Gal. iv. 22). Some rabbinical traditions (Ber. R. 67 d.) identify her with Keturah, the second wife of Abraham, mentioned Gen. xxv. 1; others (Ber. R. 51 d.) make her the daughter of Pharaoh, who, seeing the miraculous interference on behalf of Abraham in Egypt, said: "Better that my daughter should be the slave of this man than the queen of any other." The Mohammedans look upon Hagar as the legal wife of Abraham, and she is supposed to be buried in Mecca.

HAGBERRY. See BIRD-CHERRY and NETTLE TREE.

HAGEN, an industrious and thriving t. of Prussia, in Westphalia, is situated on the Volme, 26 m. w. of Arnsberg. It has a pop. (1875) of 24,218, who carry on puddling and ironfounding, manufactures of iron, steel, and copper goods, cloth, leather, paper, etc.

HAGENAU. See HAGUENAU, *ante*.

HAGENBACH, KARL RUDOLF, German theologian, was b. Mar. 4, 1801, at Basel, where his father, Karl Friedrich Hagenbach, author of the *Tentamen Floræ Basileensis*, was professor of anatomy and botany. While at the universities of Bonn and Berlin, he became acquainted with the direction given to theology by Schleiermacher; and on his return to Basel, he received, from his intercourse with De Wette, a fresh impulse to the development of his theological opinions. After being an extraordinary professor, he became ordinary professor of theology in 1828, becoming an honorary doctor of theology in 1830. He delivered to public audiences beyond the university, and afterwards published through the press, several courses of lectures on the nature and history of the reformation (*Wesen u. Gesch. d. Reformation*, 6 vols. 1834–43; 2d ed., 1851–56), on the early history of the church (*Aeltere Kirchengesch*, 2d ed., 1857–63), and on the church history of the 18th and 19th centuries (*Kirchengesch, d.* 18 *u.* 19 *Jahrh.*, 2 vols., 3d ed., 1856, translated into English). His tabular view of the history of dogmas (1828), and his compend of the same department of historical theology (*Lehrbuch, d. Dogmengesch.*, 2 vols., 4th ed., 1857, translated into English), are highly praised. His *Encyklopädie u. Methodologie d Theologischen Wissenschaften* is one of the most useful manuals for the student of German theology, and its popularity in Germany has necessitated nine editions. A history of evangelical Protestantism, several volumes of sermons, a memorial of De Wette, and a work on religious education in the gymnasia, have also come from his pen, and he gave proof of his poetical talents in two small volumes of poetry, and in a collection of poems entitled *Luther u. Seine Zeit.* Hagen-

bach died in 1874.—Of Hagenbach's brothers, JOHANN JAKOB gained distinction as an entomologist, and EDUARD as a physiologist.

HAGERSTOWN, a t. in Maryland, U. S., 66 m. w.n.w. from Baltimore. It is a well-built town with twelve churches, two academies, five newspaper-offices, court-house, town-hall, almshouse, and jail. Pop.'70, 5,779.

HAG-FISH, GLUTINOUS HAG, or BOREZ, a marine fish which forms with the lampreys one of the lowest orders of vertebrates. Similar in form to a lamprey, it is usually found within the body of dead cod or haddock, on the flesh of which it feeds after having buried itself in the abdomen. When caught, it secretes a thick glutinous slime in such quantities that it is commonly believed to have the power of converting water into glue. It is occasionally found in the north Atlantic and other temperate seas.

HAG'GADA (Heb. from *nagad, hagged*), to say, relate, is the free, rabbinical interpretation of Scripture, chiefly for homiletical purposes. As its name signifies, haggada was something "said" (not "received," like the authoritative halacha) (q.v.): legend, saga, tale, gnome, parable, allegory; in fact, poetry springing up from the sacred soil, wild, luxuriant, and entangled like a primeval forest. On its three principal directions—the *peshat* or hermeneutical investigation, *derush* or practical application, and *lod* or mystical illustrations—we cannot dwell here, nor can we follow Zunz's minute divisions of haggada into: 1. Targumim; 2. Haggadistic elements in halacha; 3. Ethical haggada; 4. Historical haggada; 5. Secret esoteric doctrine; 6. Special haggada. It flowed in an uninterrupted stream for more than a thousand years—from the Babylonian exile to the 10th c. A.D.—and its innumerable authors are either entirely anonymous or at best pseudonymous. It grew into immense dimensions, as, although orally delivered, parts of it were gradually added in the shape of marginal notes or glosses to Bible MSS., or were committed to writing in the shape of independent collections. These either followed the order of the Scripture, and were called after the special biblical book around which they had woven their fabric, or they were arranged and called after the Sabbatical and festive pericopes on which they treated. The most extensive collections, originally composed of single fragments, which have survived are Midrash Rabboth (commenced about 700 A.D., concluded about 1100 A.D.), comprising the Pentateuch and the five Megilloth, and the Pesikta (about 700 A.D.), which contains the most complete cycle of pericopes. Strangely enough, this latter itself had, through the many extracts made from it at an early period (jalkut, pesikta, rabbathi, sutarta, etc.), fallen into oblivion since the 13th c., until Zunz, in his *Die Gottesdienstl. Vorträge der Juden* (Berlin, 1832), not only proved its existence by evidence, but even restored it out of these fragments and parallel passages; and about the same time, the old MS., which agreed with Zunz's statements to the minutest details, was found by Steinschneider at Oxford.

For the general form of haggada, its language, its sources, and its development, no less than its vast influence on Christianity and Mohammedanism, and its immense usefulness for historical and theological investigations, we refer the reader to the articles MIDRASH and TALMUD.

Haggada shel Pesach is the name of a ritual, partly in Hebrew, partly in Chaldee, used on the two first evenings of the passover, which contains, besides a brief description of the exodus, extracts from the Scripture, the Mishna, Tosephta, Mechiltha, Sifri, and the two Talmuds, and some liturgical pieces. Originally within a very small compass, it has been extended to its present larger size by subsequent centuries. Two "Piutim," or religious poems, were added in the 11th c., and four more Hebrew and Chaldee songs (the last originally a German *Volkslied*) as late as the 14th century.

HAG'GAI (*Aggæus, Haggæus*), the tenth of the 12 minor prophets, and the first of those who prophesied in Palestine after the Babylonian captivity. Of his own history, nothing positive is known. It is related that he was born in Babylon, of priestly lineage, and came to Jerusalem at a very early age. The church fathers suppose him to have been one of the exiles who had returned with Zerubbabel and Joshua; and Ewald infers from ii. 3, that he was one of the few who had seen the first temple, in which case he must have been a very old man when he composed his book. The time of his prophecies, however, is known with accuracy to fall in the 6th, 7th or 8th month of the second year of Darius Hystaspis (cf. Ezra, v. 1; vi. 14; Haggai, iv. 24) = 520 B.C. Fifteen years has then elapsed since the foundations of the new temple had been laid; but during the reign of Cambyses and Pseudo-Smerdis, the work had been neglected, and even the most zealous men began to think that the time of the re-establishment of the sanctuary was not yet at hand. Suddenly Haggai presented himself before Zerubbabel and Joshua the high-priest, and strongly urged the re-establishment of the sanctuary, pointing at the same time to the famine in the land, as the divine punishment for the culpable neglect of the people, who only thought of their own houses, and not of that of God. His words made a deep impression, and the building was re-commenced (i.). The second discourse of the prophet—about a month later—predicts a still greater glory to the new temple than had belonged to the former (ii. 3–9). Two months afterwards he had to renew his reproaches against their inertness, and his promises of a blessed future (ii. 10–19). The fourth prophecy (ii. 20–23), delivered on the same day, is directed to Zerubbabel, and foretells great revolutions and political changes; but he,

Zerubbabel, shall remain a "signet" in the hands of God—i.e., the Jews and their princely leaders would not be harmed.

The style of Haggai is prosaic, and labors under an uncommon tameness and poverty of expression, principally apparent in the frequent repetition, within the short space of two chapters, of certain words and phrases, which could not well have been purposely retained for the sake of ornamentation (Eichh. Einl., s. 599). There is hardly any parallelism; but the prophet has endeavored to impart a certain vivacity to his writing by means of interrogation. The diction itself is, generally speaking, pure and clear. Haggai's name appears joined to that of Zechariah in some of the inscriptions of the Psalms (127 and 145–48 in lxx., 125, 126, 145–148 in Peshito, 111 and 145 in Vulgate), a circumstance which must point to the existence of an old tradition about these prophets having striven for the re-establishment of the music and singing of the psalms in the temple. Some critics suppose our present book of Haggai to be simply an epitome of some larger book, or a condensation of Haggai's orally delivered prophecies. However this may be, they have certainly not gained in strength by any such compression, as must well have been presumed.

HAGGAI, Book of, (*ante*) consists of four messages—portions of which were prophetic—delivered about 18 years after the return of the first part of the Jews from captivity. I. *On the first day of the sixth month of Darius's second year.* 1. Remonstrance against the refusal of the people to build the house of the Lord, and against their selfish devotedness to the adornment of their own houses. These facts declared to be the cause of the disappointments they had suffered in their harvests, food, clothing and income. 2. Exhortation to consider what their cause had been, and to reverse it by completing the temple; accompanied by the promise that the Lord, taking pleasure in their work, would use it for his glory; and followed by a renewed declaration that all the failure of their agricultural pursuits was on account of their neglect of the temple in their eagerness to enjoy their own houses. 3. Record of the obedience of the governor, high-priest, and people to the word of the Lord, of the divine co-operation with them, and their consequent zeal in re-entering on the required work. This practical result was reached within 24 days from Haggai's first message. II. *Within a month from that time* a second message was sent exhorting rulers, priests, and people to continued courage and zeal, and appealing specially to the old men who, having seen the first house in its glory, were now disheartened by the apparent insignificance of the second. All were assured that, in a little while, after great overturnings of governments and violent commotions among the nations, the desire of all nations would come, filling the second temple with greater glory than the first had ever known, and giving peace to men. III. *Three months* after the re-commencement of the work a third message was sent illustrating by emblems taken from the ceremonial law, the sinfulness of the people and the consequent impurity of their work, yet pledging to them that the gracious blessing of God should, from that day forward, be as conspicuous in their history as his judgments had already been. IV. *On the same day* the fourth message - addressed personally to Zerubbabel as the son of David and representing the Messiah who would descend from him—predicted again great wars and consequent overturning of kingdoms which would change the political aspect of the world, and in connection with which the Messiah would be made conspicuous as the signet of the Lord.

HAGHE, Louis, a well-known water-color painter of the present day, was b. in Belgium in 1802, but settled in London at an early age. He first acquired a reputation as a lithographer, his most splendid lithographic work being Robert's "Sketches in the Holy Land, Syria, Idumea, Arabia, Egypt, and Nubia." Not less superb were his lithographs of his own drawings of old Flemish interiors. Subsequently, he devoted himself to painting in water-colors, became a leading member of the association formed to promote this branch of art; and in the exhibitions of this society, his productions have always been among the most attractive. Haghe displays a decided predilection for the scenery and history of his native land. Among his pictures may be mentioned the "Palace of Courtray," and the "Audience Chamber at Bruges," which are remarkable for their harmony of color, fidelity in detail, and richness of architecture. He obtained a gold medal at the Paris Exhibition of 1855.

HAGIOGRAPHA. See Bible.

HAGNER, Peter, 1772–1850; b. Penn. Washington gave him a clerkship in the treasury department in 1793, and he served in that department in various responsible positions 56 years, resigning finally in 1849. For a large part of the time he was third auditor.

HAGUE, or The Hague, (Dutch, *'s Gravenhage*), the capital of the Netherlands, and the residence of the king, is a pleasantly situated well-built city in s. Holland. Pop. '75, 97,565. It is intersected in all directions by canals, and shady avenues of linden-trees, and abounds in palaces, public buildings, and stately houses. It has a good public library, containing 100,000 volumes, and fine galleries of paintings, the choicest of which, containing some of the most precious specimens of the Dutch school, is in the palace of the present king. The town contains 20 churches, the most notable of which is the great church, founded in 1308, and distinguished for its lofty hexagonal tower

with a *carillon* of 38 bells. The Hague is the seat of both chambers of the states-general, and of various tribunals and public offices, in one of which are deposited the archives and state papers which have been preserved by the republican and regal governments of the country for 400 years. In a historical point of view, the most interesting buildings of the Hague are the Gevangenpoort, or the prison gate-house, in which Oldenbarnevelt, the brothers De Witt, and many others distinguished in the history of Holland, have at different periods been confined; the Binnenhof, in which the former of these patriots was executed, and which, together with the Buitenhof, forms an irregular mass of public buildings of various ages, inclosed by moats, and approached by draw-bridges. Besides the palace of the king, there are, within the city, several others occupied by different members of the royal family, or with various national collections of interest, the most notable of which is the Mauritz Huis, containing a splendid collection of pictures by the Dutch masters. The palace called 't Huis in 't Bosch (The house in the wood), which lies on the outskirts of the town, in the midst of a noble wood, is specially worthy of notice for the tapestry, and the frescos and other paintings which it contains by Rubens, who, in conjunction with several of his most distinguished pupils, painted the ceiling and walls of several of the apartments. The Hague is essentially a city of fashion, and its prosperity depends chiefly on the court and nobility. The trade consists principally of book-printing, lithographing, metal-founding, carriage-building, beer-brewing, distilling gin, cabinet-work, rope-spinning, making leather, etc.; and the natives of the port (Scheveningen) gain a livelihood by fishing. In the neighborhood are many handsome country seats; and not far off is Ryswick, celebrated for the treaty of peace signed there in 1697. Scheveningen is a favorite bathing-place on the sea-coast, with which the Hague is connected by a broad causeway, bordered with rows of trees. The origin of the Hague is very ancient; and as far back as 1250, William, duke of Holland and emperor of Germany, erected a hunting-seat there, on the site of an older residence of his predecessors. In the 16th c. it was the seat of government of the states-general; and in the next century it became the birthplace of many distinguished members of the house of Orange, and amongst others, of William III. of England; while, as the residence of the stadtholders, it was naturally the center of the numerous important negotiations of European diplomacy, with which they were associated. The Hague is connected by a railway with Amsterdam, 36 m. n., and Rotterdam, 13 m. south.

HAGUE, WILLIAM, D.D., b. New York, 1805; graduated from Hamilton college, and was at various periods the pastor of Baptist churches in Boston, Providence, Albany, Chicago, Newark (N. J.), and Orange (N. J.). He has published *The Baptist Church Transplanted from the Old World to the New; Home Life Christianity and Statesmanship*, and various discourses.

HAGUENAU, a t. of the German empire, in the province of Alsace-Lorraine, ceded by the French in the war of 1870–71, is situated on the Moder, 18 m. n.n.e. of Strasburg. It had been a free town of Germany before it belonged to France. It was founded in 1164 by Frederick Barbarossa, and as it was intended for the reception of the imperial insignia, it was strongly fortified. It successfully withstood many sieges, especially during the thirty years' war; but on its occupation in 1675 by the imperialists, its fortifications were destroyed. On Oct. 17, and Dec. 22, 1793, bloody battles took place here between the French and Austrians. Haguenau is a place of considerable manufacturing industry. The German spelling is *Hagenau*. Pop. '75, 11,726.

HA HA BAY, an expansion of the Saguenay river, 7 m. long, 1 m. wide, and 60 m. from its mouth in the St. Lawrence. It is in the center of some magnificent scenery, and is a great attraction for summer tourists. The upper part of the bay displays undulating meadow-land, on whose shores are the two little villages of St. Alphonse and St. Alexis, both together containing not more than 500 inhabitants. This bay received its name from the impression which its charming scenery made upon the minds of the early French *voyageurs*, in contrast with that of the gloom and solitude of the lower river.

HAHN, AUGUST, 1792–1863; a German Protestant theologian; studied at Leipsic, and in 1819 was nominated professor extraordinary of theology at Königsberg, and in the following year received a pastoral charge and a superintendency in that city. These posts, however, he resigned on his promotion in 1821 to be professor ordinarius. In 1826 he removed as professor of theology to Leipsic, where, hitherto distinguished only as an editor of *Bardesanes*, *Marcion* and *Ephraen Syrus*, he came into extraordinary prominence as the author of a treatise, *De rationalismi qui dicitur vera indole et qua cum naturalismo contineatur ratione*, and also of an *Offene Erklärung an die Evangelische Kirche zunächst in Sachsen u. Preussen*, in which he endeavored to convince the rationalists that it was their duty voluntarily and at once to withdraw from the national church. In 1833 Hahn was called to Breslau as the theological professor and consistorial councilor, and in 1844 he became general superintendent of the province of Silesia. Among the other literary labors by which he is best known are his edition of the Hebrew Bible and his *Bibliothek der Symbole und Glaubensregeln der apostolisch-katholischen Kirche*.

HAHNEMANN, SAMUEL, a celebrated German physician, was b. in April, 1755, at Meissen, a small t. in the neighborhood of Dresden, the capital of Saxony. His father—a painter of the ware known as Dresden china—intended his son to follow his

own occupation, but the boy displayed so ardent a love of letters that the head-master of the college (*Fürstenschule*) of Meissen afforded him gratuitously all the advantages of that institution, and he remained at it till he was 20 years of age. He then left Meissen, with 20 crowns as his whole fortune, and went to Leipsic, to prosecute his medical studies. Here he maintained himself by translating works out of Latin, French, and English into German. By his industry and frugality, he saved enough of money to enable him to visit Vienna, where, under the direction of Dr. Quarin, he pursued his studies, and after various vicissitudes of fortune, he returned to Saxony, and settled in Dresden in the year 1784. Here he discovered a new salt of mercury, known by the name of *mercurius solubilis hahnemanni*, and still extensively employed by physicians in Germany. He also published a monograph upon arsenical poisoning, which is distinguished by such accuracy of observation and clearness of diction as to be quoted with approval by Christison and other modern toxicologists. After spending four years in Dresden, where he had for a time the direction of a large hospital, he returned in the year 1789 to Leipsic. In the following year, while translating Cullen's *Materia Medica* out of English into German, his attention was arrested by the insufficient explanations advanced in that work of the cure of ague by cinchona bark. By way of experiment, he took a large dose of that substance, to ascertain its action on the healthy body. In the course of a few days, he experienced the symptoms of ague; and it then occurred to him that perhaps *the reason why cinchona cures ague is because it has the power to produce symptoms in a healthy person similar to those of ague.* To ascertain the truth of this conjecture, he ransacked the records of medicine for well-attested cures effected by single remedies; and finding sufficient evidence of this fact, he advanced a step further, and proposed in an article published in *Hufeland's Journal*, in the year 1797, to apply this new principle to the discovery of the proper medicines for every form of disease. Soon afterwards, he published a case to illustrate his method. It was one of a very severe kind of colic cured by a strong dose of *veratrum album*. Before this substance gave relief to the patient, it excited a severe aggravation of his symptoms. This induced Hahnemann, instead of drops and grains, to give the fraction of a drop or grain, and he thus introduced *infinitesimal* doses. Some years later he applied his new principle in the treatment of scarlet fever; and finding that belladonna cured the peculiar type of that disease which then prevailed in Germany, he proposed to give this medicine as a *prophylactic*, or preventive against scarlet fever. From that time it has been extensively employed for this purpose. In the year 1810 he published his great work entitled *Organon of Medicine*, which has been translated into all European languages, as well as into Arabic. In this book he fully expounded his new system, which he called homœopathy. See HOMŒOPATHY. His next publication was a *Materia Medica* consisting of a description of the effects of medicines upon persons in health. These works were published between the years 1810 and 1821, at Leipsic, where he founded a school, and was surrounded by disciples. As his system involved the administration of medicines, each separately by itself, and in doses infinitely minute, there was no longer any need of the apothecary's intervention between the physician and the patient. In consequence of this, the apothecaries' company brought to bear upon Hahnemann an act forbidding physicians to dispense their own medicines, and with such effect that he was obliged to leave Leipsic. The grand duke of Anhalt-Köthen appointed him his physician, and invited him to live at Köthen. Thither, accordingly, he removed in the year 1821, and there he prepared various new editions of his *Organon* and new volumes of his *Materia Medica* for publication. In 1835 he married a second time; his wife was a French lady of considerable position; and in the same year he left Köthen, and settled in Paris, where he enjoyed a great reputation till his death, which took place in the year 1843. On the centenary of his birth-year, in 1855, a statue was erected to his honor at Leipsic, at the expense of his disciples in Germany, France, England, and other countries, with the concurrence of the local authorities, which supplied the site in one of the public places in their handsome town.

Hahnemann is universally acknowledged to have displayed great genius, industry, and erudition. Jean Paul Richter calls him "a prodigy of philosophy and learning." He was a man of unblemished purity of morals, and his life, as well as his writings, was characterized by strong natural piety. He left a numerous family of sons and daughters.

HAHN-HAHN, IDA, Countess, daughter of Karl Friedrich, count von Hahn, a well-known authoress, was b. at Tressow, in Mecklenburg-Schwerin, June 22, 1805. At the age of 21 she married a relative of her own; but the union proving unhappy, was dissolved in 1829. The lady sought consolation in poetry and travel, and visited Switzerland, Vienna, Italy, Spain, France, Sweden, and finally Syria and the east. In 1850 sick of her restless and unsatisfactory mode of life, she embraced Roman Catholicism, and two years later, entered the mother-house of the order of the Good Shepherd at Angers. Her writings, consisting of poems, novels, voyages, etc., are voluminous, and are generally marked by morbid sentimentality and aristocratic prejudice. She is sometimes clever, and even brilliant, but always superficial. Several of her novels have been translated into English.

HAICTITES, the name given to a Mussulman sect, which attempted to amalgamate their own and the Christian religion, and anticipated the second coming of Christ to

judge the world, because the Koran says: "Oh Mohammed, thou shalt see thy Lord coming in the clouds."

HAIDUCKS (i.e., drovers, from the Hungarian *hajdú*, plural *hajduk*), originally a designation of cattle-herds in Hungary. Afterwards, the word came to signify a class of mercenary foot-soldiers ready to accept pay from any one who would employ their services, but displaying great gallantry on the field of battle. The remarkable constancy with which they stood by Bocskai throughout the war of the revolution, was rewarded by that prince with a grant of a district as their own possession, and at the same time with the privileges of nobility. This grant was made by a public decree of Dec. 12, 1605, and was confirmed by the diet in 1613. Except the privilege of exemption from taxes, which Charles III. took away, the Haiducks enjoy all the rights of nobles to the present day. Their residence, the Haiduck district, remains independent of the country authorities, and is under the direct administration of the national government. The Haiduck district lies within the country of North Bihar, between the Theiss and Transylvania, has an area of about 594 sq.m., and six principal Haiduck towns. The capital of the district used to be Böszörmény. The total pop. is about 63,000, all Magyars, and for the most part belonging to the Reformed church. In 1876 this district was incorporated with portions of two adjoining districts into a new administrative division (called *Haidukencomitat*) with Debreczin for its capital. In course of the present century, the name Haiducks has begun to be applied to the macers of Hungarian courts and the halberdiers of the Hungarian magnates; also to the lackeys and other attendants in German courts.

HAIGHT, BENJAMIN I., S.T.D., LL.D., b. New York, 1809; graduated at Columbia college and the general theological seminary in New York. He was ordained in that year and chosen rector of St. Peter's (Prot. Epis.) church. In 1854 he went to Cincinnati, and was three years rector of St. Paul's. In 1857 he was called to All Saints, church, New York, remaining there until 1846. He was for 18 years professor of pastoral theology and pulpit oratory in the general theological seminary. In 1855 he was sent to Trinity parish, and in 1874 was chosen assistant rector. He has been a delegate in three general conventions. In 1873 he was chosen bishop of Massachusetts, but ill health compelled him to decline the office. For 20 years he was secretary of the diocese of New York, and in the meantime held various other honorable offices, among then that of trustee of Columbia college.

HAILES, LORD. See DALRYMPLE, Sir DAVID, *ante*.

HAIL, HAILSTORM. The word hail, in English, is unfortunately used to denote two phenomena of apparently different origin. In French, we have the terms *grêle* and *grésil*—the former of which is hail proper; the latter denotes the fine grains, like small shot, which often fall in winter, much more rarely in summer, and generally precede snow. The cause of the latter seems to be simply the freezing of rain-drops as they pass in their fall through a colder region of air than that where they originated. We know by balloon ascents and various other methods of observation, that even in calm weather different strata of the atmosphere have extremely different temperatures, a stratum far under the freezing-point being often observed between two others comparatively warm.

But that true hail, though the process of its formation is not yet perfectly understood, depends mainly upon the meeting of two nearly opposite currents of air—one hot and saturated with vapor, the other very cold—is rendered pretty certain by such facts as the following: A hailstorm is generally a merely local phenomenon, or at most, ravages a belt of land of no great breadth, though it may be of considerable length. Hailstorms occur in the greatest perfection in the warmest season, and at the warmest period of the day, and generally are most severe in the most tropical climates. A fall of hail generally *precedes*, sometimes accompanies, and rarely, if ever, follows a thunder-shower. A common idea, which has found its way, as many popular prejudices continually do, into scientific treatises, assigns electricity as the origin of hail. But all observation, rightly interpreted, seems to show that electricity and hail are *results* of the same combination of causes.

When a mass of air, saturated with vapor, rising to a higher level, meets a cold one, there is, of course, instant condensation of vapor into ice by the cold due to expansion; at the same time, there is generally a rapid production of electricity, the effect of which upon such light masses as small hailstones is to give them in general rapid motion in various directions successively. These motions are in addition to the vortex motions, or eddies, caused in the air by the meeting of the rising and descending currents. The small ice-masses then moving in all directions impinge upon each other sometimes with great force, producing that peculiar rattling sound which almost invariably precedes a hail-shower. At the same time, by a well-known property of ice (REGELATION), the impinging masses are frozen together; and this process continues until the weight of the accumulated mass enables it to overcome the vortices and the electrical attractions, when it falls as a larger or smaller hailstone. On examining such hailstones, which may have any size from that of a pea to that of a walnut, or even an orange, we at once recognize the composite character which might be expected from such a mode of aggregation. Hailstones are reported to have fallen in tropical countries sometimes as large

as a sheep, sometimes as large as an ox, or even an elephant! But it is probable that the aggregation in these cases was produced by regelation at the surface of the earth, when a series of large masses had impinged on each other, having fallen successively on the same spot. Whether this be the true explanation or no, it is certain that in British India, at the warmest season, hailstones have remained of considerable size for many days after their fall. A curious instance of the fall of large hail, or rather ice-masses, occurred on one of her majesty's ships off the cape in Jan., 1860. Here the stones were the size of half-bricks, and beat several of the crew off the rigging, doing serious injury.

We may conclude by a description (taken from *Mem. de l'Acad. des Sciences*, 1790) of one of the most disastrous hailstorms that has occurred in Europe for many years back. It illustrates very happily the greater part of what we have said about the origin of this meteor. This storm passed over parts of Holland and France in July, 1788. It traveled *simultaneously* along two lines nearly parallel—the eastern one had a breadth of from half a league to five leagues, the western of from three to five leagues. The space between was visited only by heavy rain; its breadth varied from three to five and a half leagues. At the outer border of each, there was also heavy rain, but we are not told how far it extended. The general direction of the meteor was from s.w. to n.e. The length was at least a hundred leagues; but from other reports, it may be gathered that it really extended to nearly two hundred. It seems to have originated near the Pyrenees, and to have traveled at a mean rate of about sixteen and a half leagues per hour towards the Baltic, where it was lost sight of. The hail only fell for about seven and a half minutes at any one place. The hailstones were generally of irregular form; the heaviest weighed about eight French ounces. This storm devastated 1039 parishes in France alone, and an official inquiry fixed the damage at about 24,690,000 francs—nearly a million of English money.

HAIMHALDA'RE, an old Scotch law-term, meaning to recover one's goods and bring them home again—now disused.

HAIM'SUCKEN, or HAMESUCKEN, a Scotch law-term, denoting the offense of feloniously assaulting a man in his own house or lodgings. This was an aggravation of the ordinary offense of assault. It was not so in England, where there is no peculiar name to distinguish this from other assaults.

HAIMU'RA, *Erythrinus macrodan*, a large fresh-water fish of Guiana, highly esteemed for the table. It belongs to a small family of fishes, *erythrinidæ*, exhibiting relations to the herring, salmon, and carp families. It is sometimes 4 ft. in length. The teeth are large, and so formidable, that instances are said to have occurred of a captured haimura biting off a man's hand. The haimura abounds particularly in the upper parts of the rivers of Guiana.

HAINAN', a large island in the China sea, constituting a department of the province of Kwang-tung, is about 180 m. long and 101 broad, and is separated from the mainland by a strait 15 m. wide, filled with shoals and reefs. Its principal city, Kiung-chau, in 20° 7′ n. lat., and 110° 15′ e. long., is the most southern of the ports open for trade. The interior of the island is mountainous, and the inhabitants give but a partial submission to the Chinese. The pop. is about 1,500,000. Its productions are rice, sweet potatoes, sugar, tobacco, fruits, timber, and wax. Typhoons or cyclones are frequent off the coast during the summer months. Whaling is pursued here with success by Chinese fishermen.

HAINAN (*ante*), forms a *foo* or department of the Kwang-tung, though strictly only a portion of the island, is under Chinese administration, the remainder being still unsubjugated. The capital, Kiung-chow-foo, situated in the n. some 10 *li* (3 m.) from the coast, is well-built and compact, with a pop. which has been over-estimated at 200,000, but C. C. Stuhlmann in the *Globus*, 1876, gives the correct figure as 100,000. The principal industrial products of the capital are carved articles in cocoa nut and scented woods. In 1630 it was the seat of a Roman Catholic mission, under Benoit de Mathos, a Portuguese Jesuit, and the old cemetery contains about 113 Christian graves. The port of Kiung-chow-foo at the mouth of the river is nearly dry at low water, and is called simply *hoi how*, i.e., seaport.

The two towns are united by a good road, along which a large traffic is maintained. The net value of the trade of the port, that is the foreign and native imports, less the re-exports and native imports of local origin, rose from 684,772 taels in 1876 to 1,215,056 in 1878. Out of 182 vessels engaged in the foreign trade in 1878, with a tonnage of 87,290 tons, 152 were British, with a tonnage of 70,078 tons. The exports comprise leather, hides, skins, tallow, sugar, to the value of 204,427 taels; hemp, galangal, lung-ngan pulps, grass, cloth, and silk and sesamum, to the value of 41,936 taels. The pop. of the entire island is estimated at 2,500,000. At its first conquest 23,000 families were introduced from the mainland. In 1300 the Chinese assign it 166,257 inhabitants; in 1370, 291,000; in 1617, 250,524, and in 1835, 1,350,000.

HAINAUT, FRENCH. See the French department of NORD.

HAINAUT, or HAINAULT (Ger. *Hennegau*), a frontier province of Belgium, is bounded on the e. by the province of Namur, on the n. by the provinces of Brabant and e. and

w. Flanders, and on the s.w. by France. Area, 1424 sq.m.; pop. '74, 949,346. The surface consists in the n. and w. of flat and fruitful plains, the s. is occupied by the forest of Ardennes. Hills occur only in the s.e., and consequently the course of most of the rivers is toward the w. and n.w. The principal rivers are the Haine—from which the province has its name—the Scheldt, the Dendre, and the Sambre, the last a tributary of the Meuse. The soil is highly productive; wheat and flax are very extensively grown. Excellent breeds of horses, horned cattle, and sheep are reared. Toward the w., in the neighborhood of Mons, are very extensive coal-fields. There are in this district more than 200 coal-pits, from which about 2,000,000 tons of coal are annually exported. Iron is also produced in considerable quantity, and marble, building stone, and limestone are quarried. Linen, porcelain, and pens are extensively manufactured.

HAI'NBURG, or HAIMBURG, a small but old and interesting t. of Austria, in the crown-land of Lower Austria, is situated on the right bank of the Danube, 27 m. e.s.e. of Vienna, and 2 m. from the Hungarian frontier. It is surrounded by old walls, pierced by two castellated gates, and contains an imperial tobacco factory, the largest in the country, an institution for cadets, and an infantry school. Among its more notable edifices are the town-house, with a Roman altar, a tower, called the Roman tower, with the supposed statue of Attila, and on the summit of the Castle Hill the remains of an old castle, destroyed in 1596, when its powder-magazine was struck by lightning. Pop. '69, 4,178.

Many consider Hainburg the ancient *Carnuntum*, once an important Roman stronghold and the station of the Danubian fleet, and which rose to its highest prosperity during the reign of M. Aurelius. However this may be, it is certain that considerable remains of the fortifications of *Carnuntum* are found in the immediate vicinity. A Roman aqueduct still supplies the market of Hainburg with water. In the *Nibelungenlied*, the castle of Hainburg is called Heimburc, the border fortress of the country of the Huns. It was forcibly torn from the Hungarians in 1042 by the emperor Henry III., and afterwards it became a residence of the Austrian princes.

HAINICHEN, a t. of Saxony, 28 m. w.s w. of Dresden, on a tributary of the Mulde. Wool-spinning, weaving, and the manufacture of cloth are carried on. Pop. '75, 8,468.

HAIR, including bristles, wool, fur, etc., is a modification of the epidermis (q.v.), and consists essentially of nucleated particles. An ordinary hair consists of a *shaft* and a *bulb*. The shaft is that part which is fully formed, and projects beyond the surface. If we trace it to the skin, we find it rooted in a follicle in the cutis or true skin, or even in the connective or cellular tissue beneath it. This follicle is bulbous at its deepest part, like the hair which it contains, and its sides are lined with a layer of cells continuous with the epidermis. The layer of epidermic cells, according to Todd and Bowman, (*Physiological Anatomy*, vol. i. p. 417), "resembles the cuticle in the rounded form of its deep cells, and the scaly character of the more superficial ones, which are here in contact with the outside of the hair. The hair grows from the bottom of the follicle, and the cells of the deepest stratum gradually enlarge as they mount in the soft bulb of the hair, which owes its size to this circumstance. If the hair is to be colored, the pigment cells are also here developed. It frequently happens that the cells in the axis of the bulb become loaded with pigment at one period, and not at another, so that, as they pass upwards in the shaft, a dark central tract is produced, of greater or less length, and the hair appears here and there to be tubular. The shaft is much narrower than the bulb, and is produced by the rather abrupt condensation and elongation into the hard fibers of the cells, both of those which contain pigments and those which do not." If the tissue is softened by acetic acid, these fibers may be readily seen under the microscope; they seem to be united into a solid rod by a material similar to that which cements the scales of the cuticle. The central cells, when filled with pigment, have less tendency to become fibrous than those lying more externally; and hence some writers have described the center as a *medulla*, in distinction from the more fibrous part of the shaft, which they term the *cortex*. (This tubular character is constant in the hair of many animals, but is very variable in human hair, and even in the same hair at different parts of its length.) The term *cortex* or *bark* is more correctly applied to the single outermost layer of cells which overlap one another, and cause the sinuous transverse lines which are seen on examining a hair under the microscope.

In some hairs, especially those which act as tactile organs in some of the lower animals (as, for instance, in the whiskers of the various cats), a true papilla, furnished with nerves and capillaries, projects into the hair-bulb, and an approach to this papillary projection may often be seen in human hairs.

The hairs, like epidermis, are thus seen to be organized, and to maintain a vital, although not usually a vascular connection with the body. The color of hair seems to depend on the presence of a peculiar oil, which is of a sepia tint in dark hair, blood-red in red hair, and yellowish in fair hair. This oil may be extracted by alcohol or ether, and the hair is then left of a grayish yellow tint. The chemical composition of hair closely resembles that of horn, and will be described in the article HORNY TISSUES.

Hair is extremely strong and elastic, and hence its uses for the construction of fishing-lines, the stuffing of cushions, balls, etc. Amongst its other physical properties, we

may mention that, when dry and warm, it is easily rendered electrical, and that it is extremely hygroscopical; readily attracting moisture from the atmosphere, and no doubt from the body also, and yielding it again by evaporation when the air is dry. Hairs elongate very considerably when moist—a property of which Saussure availed himself in the construction of his hygrometer, in which a human hair, by its elongation and contraction, according as the atmosphere is moist or dry, is made to turn a delicate index.

Hairs are found on all parts of the surface of the human body, except the palms of the hands and the soles of the feet; they differ, however, extremely in length, thickness, shape, and color, according to situation, age, sex, or race. The differences dependent on situation, age, and sex, are so obvious that we shall pass them over without notice, and proceed to the most important differences dependent on race. With respect to the quantity of hair that grows on the human body, there are great differences in different races. The Mongols, and other northern Asiatics who are similar to them, are noted for the deficiency of their hair and for scanty beards, and the same character is ascribed to all the American nations; while, on the other hand, among the *Ainos*, or in the Kurilian race, there are individuals who have the hair growing down the back, and covering nearly the whole body. The northern Asiatics and the Americans have generally straight lank hair, while Europeans have it sometimes straight and flowing, and occasionally curled and crisped. Negroes present every possible gradation, from a completely crisp, or what is termed woolly hair, to merely curled, and even flowing hair; and a similar observation holds regarding the natives of the islands in the great Southern ocean. As there is a generally diffused opinion that the head of the African is covered with a species of wool instead of with true hair, we may mention that all true wools which have been examined microscopically (as merino wool, the wool of the tiger, rabbit, bear, seal, and wolf-dog, which were investigated by the late Mr. Youatt), present a more or less sharply serrated or jagged surface, while hairs present merely an imbricated appearance. "Hairs of a negro, of a mulatto, of Europeans, and of some Abyssinians, sent to me (says Dr. Prichard) by M. d'Abbadie, the celebrated traveler, were, together with the wool of a southdown sheep, viewed both as transparent and opaque bodies. The filament of wool had a very rough and irregular surface; the filament of negro's hair, which was extremely unlike that of wool and of all the other varieties mentioned, had the appearance of a cylinder, and the coloring matter was apparently much more abundant than in the others." It is in consequence of the above named difference between hair and wool that although the former will entangle to a certain degree, it will not felt into a compact mass, which is the characteristic property of good wool.

The grayness of hair in advanced life results from a deficient secretion of pigment. Well-authenticated cases are on record in which the hair has grown gray or white in a single night, from the influence of fear, distress, or any variety of strong mental excitement. It is not easy to explain this phenomenon. Vauquelin suggested that it might result from the secretion at the bulb of some fluid (perhaps an acid), which percolates the hair, and chemically destroys the coloring matter.

The chief use of the hair, and particularly of the fur of various mammals which is especially developed in the winter, is to protect the body from external cold. Except on the scalp, and on the throat, this cannot be considered as applying to man. What, then, are the uses of the hair on the face, and especially on the upper lip? We shall answer this question with an extract from an article "On the Use of the Hair" in *The Lancet* for Nov. 3, 1860: "Mr. Chadwick, who has done so much for sanitary reform, tells us that he was once very much struck by seeing some blacksmiths who wore beards with their mustaches discolored by a quantity of iron dust which had accumulated amongst the hairs. Turning it over in his mind, it struck him that had not the dust been so arrested by a natural respirator, it must have found its way into the lungs, where it could not have been otherwise than productive of evil consequences. He hence rightly advised that the razor should be discarded by laborers in all dusty trades —such as millers, bakers, masons, etc.; by workmen employed in grinding iron, or steel; and by travelers on dusty roads. In hot, sandy countries, the use of the beard is soon discovered; and travelers in Syria and Egypt find it necessary to defend their mouths against the entrance of the hot air of the desert. But not against dust alone is the facial hair a protection; it is the best barrier against cold air, biting winds, and wheezy fogs that a Northman can obtain. . . . . According to Mr. Chadwick, the sappers and miners of the French army, who are remarkable for the size and beauty of their beards, enjoy a special immunity against bronchial affections." In corroboration of the last-named fact, we may mention another of a still more striking character. During the long-continued search for Franklin's expedition, a transport vessel, the *North Star*, was frozen up during one of the severest arctic winters on record, in Wolstenholme sound. The crew maintained their health perfectly during all the trials to which they were exposed. On their return to England in the early summer, they shaved off the hair that had been growing around the mouth and throat for the last eight or nine months, and within a week *every man* was on the sick list with some form of bronchial or pulmonary disorder.

The length to which the hair of the head may grow normally, especially in women,

is very considerable. In the "Hair Court" of the international exhibition (1862), there was a beautiful specimen of jet-black hair (British, we believe,) measuring 74 inches.

Cases occasionally occur where there is an abnormal abundance of hair of considerable length in women, on parts where the hair is usually little more than down. A hairy lady, named Julia Pastrana, supposed to be a Mexican, was some years ago exhibited in London. Her embalmed body was exhibited also in that city in 1862, and we extract the following remarks from a memoir on her in *The Lancet* for May 3 of that year: "The ears, and all parts of the face except the eyes, were covered with hair of different lengths. The beard was tolerably thick, the hairs composing it being straight, black, and bristly, the part of it which grew on the sides of the chin hanging down like two plaits. . . . The upper portion of the back of the neck and the hinder surface of the ears, were covered with hairs. On the shoulders and legs, the hairs were as abundant as they are occasionally seen on very powerful men."

Dr. Chowne has described similar but less marked cases of hairy women in *The Lancet* for 1843.

HAIRBELL. See HAREBELL, *ante*.

HAIR-DRESSING. As a matter of convenience, as well as of taste and fashion, the dressing of the hair has received much attention in all civilized nations, ancient and modern. The growth of hair on the sides and lower part of the male face has caused some perplexity in management, and as a method of overcoming the difficulty, shaving has been resorted to, although at the sacrifice of what nature gives to distinguish the male from the female countenance, and also to protect the respiratory organs. See BEARD. The Jews, by their scriptural law, were enjoined not to shave. The Romans shaved, and so did their immediate successors, the Romanized Britons. The Saxons and Danes did not shave, and wore long hair. The Normans shaved, but they, too, adopted long hair as a fashion; and from them, and the more modern French, the courtiers and cavaliers of the 17th c. adopted the practice of wearing those flowing "love-locks" which excited the ire of the Puritans. It was, however, in the management of ladies' hair, that the art of the professional hair-dresser was in those times mainly exercised. In the 18th c., through the influence of French fashions, the dressing of hair, male and female, rose to a great pitch of extravagance and folly. The hair of a lady of fashion was frizzed up in convolutions and curls, decorated with ribbons, jewels, and feathers, and filled with pomatum and powder to a degree perfectly monstrous. As women of less exalted rank slavishly attempted to follow these absurdities, the business of dressing hair was extensively followed. The cost of a full dressing being, however, too high to be lightly incurred, often one dressing was made to suffice for a week or fortnight, during which period such care was taken to preserve the greasy fabric undisturbed, that it became the resort of insects, and how to extinguish these odious pests was in itself a matter of serious concern. From pressure of business, it frequently happened that, previous to balls, ladies' hair had to be dressed one or two days in advance; and to keep the head-dress uninjured, the lady sat in a chair perhaps two nights, instead of going to bed. The writer of this has conversed with a lady who in this manner sat up one night for the sake of her finely powdered and frizzed-up hair. A taxation on hair-powder, along with the simplification of fashions consequent on the French revolution, not only expelled hair-powder and perruques, but brought the profession of hair-dresser within reasonable bounds. As regards ladies' hair, fashion is constantly altering; and at present the chignon, consisting of cushions at the back or top of the head, and covered with hair, is gradually giving way to a system of coils and plaits. With respect to men's hair, short cutting is now universal, and any indulgence in long hair behind is thought to mark a degree of slovenliness or whimsicality of fancy. Pursued as an ordinary business in England and continental countries, hair-dressing in the United States is entirely resigned to men of color, and in connection with many of the hotels they are provided with workrooms.

Innumerable are the oils, essences, and pomades which are vended for the hair, on the assumption that they improve and nourish it. According to the experience of the best perruquiers, all such applications, any unguent in particular, and however sanctioned by tradition, are injurious. In ordinary circumstances, regular but not violent brushing is preferable for maintaining cleanliness and glossiness. When the head becomes affected with scurf which the brush does not remove, let the following efficacious and simple method of purification be adopted. Beat up an egg, and rub it well in all over the head; then pour over it warm water, which, while removing the egg, will likewise carry away all the scurf; lastly, dry thoroughly with a cloth. The head may be hung over a small tub during the process. After this, the hair will be very clean, and will take on a fine gloss with a brush. On no account use sharp combs to clean the head, for they are apt to irritate the roots of the hair, and after all fail in the desired object.

HAIR DYES. Various means have been adopted for changing the natural color of the hair to a more favored one, and for hiding the approaches of age, as indicated by the presence of gray hairs. These usually consist in washing the hair with a solution of some metallic salt known to have the effect of darkening its color. These are the salts or oxides of silver, mercury, lead, and bismuth. The most perfect mode of dyeing

the hair, however, is that of previously preparing it by a complete soaking with a solution of sulphide of potassium; the strength of this solution must depend on the depth of tint intended to be given; the stronger the solution, the darker the color will be. When thoroughly wetted, the hair is allowed to dry partially; and whilst still damp, it is to be again thoroughly wetted with a solution of nitrate of silver, also proportioned in strength by the same rule as in the case of the solution first applied. This makes a very permanent dye, which only requires renewing as the new growth of hair becomes conspicuous. The fashion of dyeing the hair is very ancient, and belongs as much to savage as to civilized nations; but in the case of the former, vegetable dyes have been chiefly used; and the ladies of China and other eastern countries also resort to the same: the juice of the petals of hibiscus trionum, the bladder-ketmia, and probably other species of hibiscus, is in general use with them.

The detection of stained hair is sometimes an object of medico-legal investigation. Lead may be detected by boiling the hair in dilute nitric acid, and then applying the tests for lead (q.v.) to the acid solution; while the presence of silver may be shown by digesting the hair in dilute hydrochloric acid or chlorine water, when the resulting chloride of silver may be dissolved out with a solution of ammonia, and submitted to the ordinary tests for silver (q.v.).

HAIR GRASS, *Aira*, a genus of grasses, having loosely panicled flowers, and two unequal glumes containing two perfect florets, each with two thin membranous paleæ, of which the outer is generally awned near the base. The species are natives of temperate and cold climates. A number of them are natives of Britain, some of which are of very humble growth, and are chiefly found in moors, sandy pastures, and other situations where the soil is unfertile. The TUFTED HAIR GRASS, or TURFY HAIR GRASS. (*A. cæspitosa*), common in better pastures and meadows, is a beautiful grass when in flower, but forms coarse tufts; has very rough leaves, which, if drawn roughly across the hand, inflict considerable wounds, whence the plant sometimes receives the name of "cutting grass." It is rejected by cattle, if other herbage is within their reach. It attains a height of 2 to 4 ft., and is sometimes used for thatching ricks of hay or corn, and in some places for making mats. It grows luxuriantly in moist situations, and indicates a soil in want of draining. It is sometimes tolerated, in order to add to the bulk of *bog hay* in moorish grounds, but is carefully extirpated wherever agricultural improvement takes place. For its extirpation, drainage is requisite above all things; but the digging out of the tufts is also practiced, and other grasses are sown instead. This grass is, however, sometimes sown to form cover for game, particularly hares; and in marshy situations, for snipes and wild fowl. It is the *windiestrae* of the Scotch. Allied to the genus *aira* is *catabrosa* (q.v.).

HAIR MANUFACTURES. These consist of fabrics woven or felted of various kinds of hair; brushes made of particular kinds of hair; and ornamental hair-work.

Woven Fabrics.—The most important in this country is the horse-hair cloth so extensively used for covering the seats of chairs, couches, and other articles of furniture; this is made of the long hair of horses' tails. As the hair is of such various colors, it is necessary to dye all the darker shades so as to produce a uniform glossy black; this is done by logwood and sulphate of iron (copperas) in the following manner: The hair must first be cleansed and deprived of its grease by soaking it in lime-water for a day; it is then transferred to the dye-vat, which is thus prepared for a hundredweight of hair. Sufficient water to fill a boiler large enough to receive the hair, is boiled with 60 lbs. of cut logwood for three hours, after which it is suffered to cool, when 2 lbs. of copperas are added. This constitutes the bath, as it is called; and the hair, after being removed from the lime-water, and well washed in soft-water, either rain or river, is immersed in it for 24 hours; it is then removed, and again washed, to free it from the superfluous dye, dried, and shaken out ready for use. Perfectly white horse-hair can be dyed various colors, and is well adapted to receive the brighter ones, hence it has been much used of late years to produce ornamental hair-cloth, which are in great request abroad, especially in South America. The weaving of horse-hair cloth is different from that of other tissues, in consequence of the shortness of the hair, which, for the same reason, can only be used for the weft except in the open or sieve cloth which is only made in small squares for the sieve-makers. Each hair has to be worked singly, and the loom requires two persons to work it. The warp used is either worsted, cotton, or linen yarn, generally the last. The hairs for the weft are kept wet by the side of the weaver, and are handed to him one by one. He receives them on a kind of hook at the end of his shuttle, the hook catching a knot tied by the attendant child who hands the hair. In other respects, the weaving differs little in its general character from that ordinarily employed for other fabrics. When the web is completed, it is dressed by calendering, which gives it a smooth and glossy surface. It is to be regretted that the popular taste in Great Britain does not turn to the ornamental kinds, which are not only very beautiful, but are durable and easily cleaned. The true crinoline cloth, for ladies' dresses, etc., was at first made of horse-hair, usually the white kind; but the immense demand led to the introduction of Agave or Aloe fiber, which soon supplanted it for most purposes, except the manufacture of bonnets, for which it is largely employed both as a material for the body of the bonnet and also as a trimming. The trade in crinoline

trimming in Switzerland and France is large, and considerable quantities are imported into Britain. Horse-hair is twisted into thick yarn, and woven into sacking in the ordinary way, in Anatolia and Roumelia; and cow-hair is worked up into a rough yarn, and is woven into carpets in Germany; and in Norway is made into socks by the peasants. Pig's hair is similarly employed in China; and amongst the natives of the Hudson's Bay territories, dog's hair is used for the same purpose. The goat's hair of Thibet and Persia, and the camel's hair used in weaving, belong rather to the true wools, and will be treated of under WOOL.

The difference between hair and wool depends chiefly upon the greater or less smoothness of the surface of each fiber, hence the hairs which are smoothest cannot easily be felted, for if brought into contact, they have no projections of the surface to keep them from slipping away from each other; but some of the hairs proper, by a little preparation, may be so roughened as to fit them for felting. Thus, coney wool, or the hair of rabbits and hares, if properly moistened with a solution of nitrate of mercury, loses its straight and smooth character in drying, and is then readily felted.

The shorter kinds of horse-hair from the manes and tails, also cow-hair and the softer kinds of pig-hair, are twisted into ropes, which, after being boiled and then thoroughly dried in an oven, are pulled to pieces. The hair retains the twist given it, and is then used for stuffing seats of chairs, etc.

Brushes of hair are of various kinds; some are made of the stiff hairs from the backs of pigs, and others are made of the soft hairs of the camel and other animals. The hairs for the first kind are called bristles (see BRISTLES), which constitute an important trade with foreign countries. They are chiefly used in the manufacture of hair and clothes brushes, tooth and nail brushes, house-sweeping brooms, the larger kinds of painters' brushes, etc. The second kind are chiefly employed in the manufacture of the fine brushes or hair-pencils used by painters and artists. The best bristles come from Russia. Besides the camel, hairs are yielded for this purpose by the badger, sable, goat, dog, etc. In both cases, the sorting of the hairs into lengths is a very important and troublesome matter. Generally, it is done by placing the hairs in small boxes (with the tips upward), sufficiently deep to keep them upright; and the sorter then, with nice eye and hand, selects the sizes, by pulling out all the longest, as they overtop the others; then the next size, and so on. This, in the case of the hairs for artists' pencils, is an extremely difficult operation, as great exactness is necessary. Several attempts have been made, in Russia and in this country, to sort bristles by machinery, and one person has succeeded in doing so with a rude wooden machine. But the really successful manufacture of a machine which can be made generally available, belongs apparently to Mr. W. S. Yates of Leeds, who exhibited in the international exhibition (1862) a machine of great beauty and simplicity, which sorts into ten sizes, and with great rapidity. Most hair-brushes are required to have the bristles or hairs placed with great evenness, so as to form a flat surface outward; but in the case of those which are called artists' and painters' pencils, their value consists in having a fine point, so that the selection of the hairs so as to insure this, is a work of difficulty. The first step is, after selecting a small quantity, to see that all the tips are in one direction; this is usually done in removing them from the skin, a pair of flat-bladed pincers being employed to hold each cut of hairs, whilst the knife or shears severs them from the skin. They are then placed in small shallow tin boxes, with the tips upward; and the box being carefully shaken, and gently struck on the bottom until the hairs have completely arranged themselves in an upright position, they are then picked out, as before described; each size is placed by itself; and the brushmaker, according to the kind of pencil he is making, takes the proper size, and separating a sufficient number, they are placed upright in another little tin box, but now with the root-end of the hairs uppermost, so as to insure the tips being perfectly even, which is further insured by gently tapping the box as before. Fine thread is then looped round the base of the little bundle of hairs, and securely tied; sometimes more than one ligature is thus made; and the brush, now so far completed, only requires its handle of quill or wood, according to its size and character. Artists' pencils being of various sizes, and many extremely small, several kinds of quills are required. These are obtained from several birds, as the swan, goose, duck, fowl, pigeon, lapwing, and even such small ones as the lark and thrush. Previous to receiving the brush, the quills, besides being cut to the required lengths, have to be further prepared by soaking in water, to prevent them splitting, as the thick end of the brush is being pushed down from the wider to the narrower end. They also contract somewhat in drying, and consequently hold the brush very tightly.

Ornamental hair-work consists chiefly of the human hair plaited into chains, guards, etc., or worked up into various other fanciful devices, as souvenirs, etc. Under this head we may also mention those manufactures of the human hair which are either required to supply a personal deficiency, or to meet the demands of fashion. To the former class belong the wig, the front, and other imitations of the natural covering of the human head; and to the latter, a variety of contrivances, whose mysterious names are only known to barbers and ladies' maids, for the purpose of giving an appearance of greater abundance to the natural supply.

The wig, like all other portions of human attire, has undergone a great many variations in fashion. In the present day, the great object is, in the first place, as far as

possible, to imitate nature, and deceive the eye; and secondly, to produce wigs of extreme lightness—a full-sized peruke rarely being more than two or three ounces in weight. A full head of hair, from a young woman's head, will sometimes weigh five or six ounces. There are two heads of hair in the South Kensington museum, which are in the raw state as imported, and weigh together 11½ ounces.

The chief portion of the hair used in Great Britain is received through French dealers, who collect it from Holland and Germany, as well as from the various departments of their own country. The light colors are usually obtained from the former countries, and the dark shades from Brittany. This does not arise from the circumstance that these countries yield the finest heads of hair, but because the poverty of the people causes its sale to be a matter of importance, and the peculiar fashions of the country head-dresses render its loss of less consequence.

The wholesale price of long hair is from 30s. to 400s. per lb., and the peasants of France alone supply 20,000 lbs., of the value of £40,000. The average import, during four years from France, was 14,000 lbs., of the value of £28,000. Besides the imports from France, which chiefly comprise the darker colors, a considerable quantity comes from Germany, usually of light shades.

HAIR-POWDER, a pure white powder, made from pulverized starch, scented with violet or some other perfume, and at one time largely used for powdering over the head. The strange fashion of using hair-powder is said to have originated from some of the ballad-singers at the fair of St. Germain, in France, whitening their heads, to render themselves more attractive. Introduced into Great Britain, the fashion became universal among the higher and middle classes, and by ladies as well as gentlemen. To make the powder hold, the hair was usually greased with pomade, and accordingly the fashion was extremely troublesome. An act of parliament fixed that the fine dust of which the powder was composed should be made from starch alone; and we learn from the *Gentleman's Magazine*, that on Nov. 20, 1746, fifty-one barbers were convicted before the commissioners of excise at London, and fined £20 each, for having in their keeping hair-powder not made of starch, contrary to act of parliament; and on the 27th of the same month, forty-nine others were fined, for the like offense, in the same penalty. In 1795 a tax of a guinea (afterwards £1 3s. 6d.) was put on the use of hair-powder, and at one time yielded £20,000 per annum, but it had the effect of causing hair-powder to fall into general disuse. The French revolution, which overturned so many institutions, contributed also to the people of Europe returning to natural and unpowdered hair. When gentlemen first left off hair-powder with queues, they were considered very unfashionable; and the custom of having the hair cut short, which is quite universal at present, was then deemed vulgar. At the present day, powder continues to be used by some of the footmen of the nobility and higher ranks as part of their livery; and occasionally, at public or private *bals costumés*, ladies and gentlemen still appear with their heads powdered. The tax on hair-powder was done away with under 32 and 33 Vict. c. 14, the act which substituted a system of excise licenses for the former mode of collecting assessed taxes. At the time of its abolition, it was paid by about 800 persons, and yielded a revenue of about £1000 a year.

HAIRS, in botany, are very different from the hair of animals, although there is sometimes a considerable general resemblance, and the same purpose of protection from cold and from various atmospheric influences seems also to be sometimes served by them. They are produced by no special organ analogous to the bulbs from which the hairs of animals grow, but are composed of cellular tissue, arise from the epidermis, and are covered with extensions of the cuticle. Some hairs consist of a single elongated cell; some of several cells placed end to end. The gradations are quite indefinite between the most elongated hairs and the mere warts or rugosities which often appear on the surface of plants. In like manner, hairs pass into *bristles* (*setæ*) and prickles (*aculei*), which are merely stronger and harder hairs; but spines or thorns are totally different, arising from the wood of the stem or branch. Hairs are very often connected with *glands*, which are cells or clusters of cells, producing secretions; hairs often arise from glands, and then generally serve as ducts through which the secretion may pass: but hairs also often bear glands at their apex. Stinging hairs, as in nettles, *loasas*, and some *malpighias* (see these heads), are ducts, with venom-secreting glands at their base.

HAIR-SPRING. See BALANCE-SPRING.

HAIR-TAIL, *Trichiurus*, a genus of acanthopterous fishes, which, on account of their compressed and very elongated form, have been classed in the ribbon-fish family, but are otherwise allied to the mackerel, tunny, etc., and are therefore, in recent systematic works, referred to the family *scomberidæ*. The dorsal fin extends along the whole back, and is spiny throughout; there are no ventral fins, no anal fin, and no tail fin, the tail ending in a single elongated filament. One species, the SILVERY HAIR-TAIL (*T. lepturus*), sometimes called the blade-fish, is found in the Atlantic ocean, and has been cast on the shores of Britain, but is more common in warmer regions. It is called saber-fish in Cuba. It sometimes attains a length of 12 feet. Its flesh is good.—An East Indian species, the SAVALA (*T. savala*), is much esteemed for food, and commonly sold in the markets of India.

HAIR-WORM. See GORDIUS, *ante*.

HAJDUK, or HAIDUCK (from a Hungarian word meaning *drover, cowherd*), is the name for the population of a district in the eastern part of Hungary. The Hajduk are direct descendants of those warriors, who, during the long and bloody contest between the house of Hapsburg and the Protestant insurgents of Hungary, formed the nucleus of prince Stephen Bocskay's valiant armies. The Hajduk enjoyed privileges of nobility, and immunities from taxation ever since 1605, in which year the whole tract of land they are in possession of to the present day was given them by the above named munificent prince. Notwithstanding repeated attempts made by the Austrian government against their privileges, the Hajduk retained the peculiar organization of their district, until after the disastrous issue of the struggle in 1848–49, when they were reduced to the same level with the so-called hereditary provinces of the empire. At the dawn of the reformation, the Hajduk were among the first to adopt Calvin's doctrines (designated during a long period "the Hungarian Faith," in opposition to Luther, whose followers were chiefly among the Slaves of Upper Hungary). The Hajduk are almost exclusively addicted to agriculture, and with the simplicity of manners unite all the qualities which distinguished their ancestors. Their total number amounts to 70,000, forming six "towns." The political chief of the district bears the title of captain.

HAJILIJ, or BITO-TREE, *Balanites Ægyptiaca*, a tree of the natural order *amyridaceæ*, a native of Egypt and of central Africa, cultivated for its fruit, a drupe, which is edible, and from the seeds of which a fixed oil is expressed, called *zachun*. So much is this tree valued in central Africa, that there is a common proverb to the effect that a milch cow and a bito-tree are the same. (Barth's *Travels*.)

HAJIPUR, a t. in Bengal on the Gandak near its confluence with the Ganges, said to have been founded about 500 years ago by Haji Ilyas, the supposed ramparts of whose fort are still visible. Hajipur figures conspicuously in the history of the struggles between Akbar and his rebellious Afghan governors of Bengal, having been twice besieged and captured by the imperial troops, in 1572 and again in 1574. Its command of water traffic in three directions makes the town a place of considerable commercial importance. Within the limits of the old fort is a small stone mosque, very plain, but of peculiar architecture, and attributed to Haji Ilyas. Two other mosques and a small Hindu and Buddhist temple are in the town or its immediate vicinity. Beside the ordinary courts, the town contains a school, post-office, charitable dispensary, and distillery. Pop. '72, 22,306.

HAJJ (HAJI, HAGGE), (Heb. *Hag*. one of the three festivals appointed to the Jews for the purpose of pilgrimage to Jerusalem), Arab. pilgrimage, emphatically pilgrimage, to the Kaaba (q.v.) or temple of Mecca, which every Mohammedan, male or female, whose means and health permit, is bound to perform, once at least in his life, otherwise, "he or she might as well die a Jew or a Christian." Mohammed, after many fruitless attempts to abolish altogether the old custom of pilgrimage—prevalent among most peoples in ancient, and some even in modern times, and perhaps arising from an innate, instinctive, traveling propensity, but is not unfrequently fraught with mischievous consequences—was compelled finally to confirm it, only taking care to annul its idolatrous rites, and to destroy the great number of ancient idols around Mecca. The 12th month of the Mohammedan year, the Dsul Hajjeh, is the time fixed for the celebration of the solemnities, and the pilgrims have to set out for their journey one or two months before (in Shawâl or Dhulkada), according to the respective distances they have to traverse. They first assemble at certain variously appointed places near Mecca, in the beginning of the holy month, and the commencement of the rites is made by the male pilgrims here first putting on the Ihrâm or sacred habit, which consists of two woolen wrappers—one around their middle, the other around their shoulders; their head remains bare, and their slippers must neither cover the heel nor the instep. It is enjoined that the pilgrims, while they wear this dress, should be particularly careful to bring their words and thoughts into harmony with the sanctity of the territory they now tread, a territory in which even the life of animals is to be held sacred from any attack. Arrived at Mecca, the pilgrims proceed at once to the temple, and begin the holy rites there by walking first quickly, then slowly, seven times round the Kaaba, starting from the corner where the black stone is fixed (Tawaf). This ceremony is followed by the Sai, or running, likewise performed first slowly, then quickly, between the two mounts Safâ and Merwa, where, before Mohammed's time, the two idols Asaf and Nayelah had been worshiped. The next rite takes place on the ninth of the Dhulhajja, and consists in the Wukuf or standing in prayer on the mountain of Arafat, near Mecca, till sunset. The whole of the succeeding night in spent in holy devotions at Mogdalifa, between Arafat and Mina. The next morning, by daybreak, the pilgrims visit the Masher-al-Haram, the sacred monument (a place where the prophet stood so long in prayer that his face began to shine), and then proceed to the valley of Mirra, where they throw seven (or seventy) stones at three pillars, for the purpose of putting the devil to flight. The pilgrimage is completed with the slaughtering of the sacrifices on the same day and in the same place. The sacrifice over, they shave their heads and cut their nails, burying the latter on the same spot. They then take leave of the Kaaba, and, taking with them some sacred souvenirs, such as dust from the prophet's tomb, water from the well Zemzem,

etc., they proceed to their homes. The return of the holy caravans is watched everywhere with the most intense anxiety, and is celebrated with great pomp and rejoicings. Henceforth, the pilgrim never omits to prefix the proud name of Hajji to his name. It is permitted that those who, through bodily infirmity, are incapacitated from performing the holy journey themselves, may send a substitute, who acts as their representative in almost every respect, but this substitute has no share whatever in the merits and rewards belonging to the Hajj.

HAKE, *Merlucius*, a genus of fishes of the cod family (*gadidæ*), having a flattened head, an elongated body, two dorsal fins, of which the first is short, and the second very long, one very long anal fin, and the mouth destitute of barbels. One species, the COMMON HAKE (*M. vulgaris*), is found in the British seas, in those of the n. of Europe, and in the Mediterranean. It is sometimes 3 or 4 ft. in length; and is of a whitish color, grayish on the back. It is a very voracious fish, devouring great numbers of herrings and pilchards; hence it is frequently called the *herring hake*. It is a coarse fish; its flesh white and flaky; but it is important as an article of human food and of commerce; being salted and dried in the same manner as cod and ling, in common with which it receives in this state the name of *stock-fish*. It is generally taken by lines, like cod and ling. In the spawning season, when it keeps near the bottom, it is sometimes caught by trawl-nets.—Other species of hake are found in high southern latitudes.

HAKIM BEN ALLAH, or BEN HASHEM, called Mokanna (the veiled), or Sagende Nah (moon-maker), the founder of an Arabic sect who first appeared in the 8th c., during the reign of Mahadi, the third Abassidian caliph, at Neksheb, or Meru in Khorassan. Hakim is said to have commenced his extraordinary career as a common soldier, but to have soon been promoted to a captaincy, and finally to have put himself at the head of a band of his own. In a fight, an arrow pierced one of his eyes, and in order to hide this deformity, he henceforth constantly wore a veil, a habit attributed by other writers (Rondemir, etc.) to a desire to conceal his extraordinary ugliness—by his own followers, however, to the necessity of shrouding the dazzling rays which issued from his divine countenance from the eye of the beholder. Hakim set himself up as god. He had first, he said, assumed the body of Adam, then that of Noah, and subsequently of many other wise and great men. The last human form he pretended to have adopted was that of Abu Moslem, a prince of Khorassan. Thabari sees in this idea of metempsychosis the Jewish notion of the Shekinah—the divinity resting on some one chosen person or place and concludes that Hakim may have been a Jew. He appears to have been well versed in the art of legerdemain and "natural magic," principally as regards producing startling effects of light and color. Among other miracles, he for a whole week, to the great delight and bewilderment of his soldiers, caused a moon or moons to issue from a deep well; and so brilliant was the appearance of these luminaries, that the real moon quite disappeared by their side. Hakim found many adherents; and his little band increased so rapidly, that ere long he was able to seize upon several fortified places near the cities of Neksheb and Kesh. Sultan Mahadi marched against him, and after a long siege took the last stronghold in which he had fortified himself, together with the remnant of his army. Hakim, however, having first poisoned his soldiers with the wine of a banquet, threw himself into a vessel filled with a burning acid of such a nature that his body was entirely dissolved, and nothing remained but a few hairs, in order that the faithful might believe him to have ascended to heaven alive. Some remnants of his sect still exist, and their outward distinguishing badge is the white garb, which they wear in memory of the white garb worn by their divinity, as a standing token of opposition to the black color adopted by the Abassidian caliphs. Hakim has furnished the subject of many romances, of which the one contained in Moore's *Lalla Rookh* is the most brilliant and best known.

HAKLUYT, or **HACKLUYT**, RICHARD, an English author, was b. in 1553. While at Westminster school he eagerly perused narratives of voyages and travels, and continued this course at Christ-church, Oxford, whither he proceeded in 1575. Being appointed lecturer on geography or cosmography in that university, he introduced the use of globes and other geographical appliances into English schools. Private individuals, as well as commercial companies and towns, consulted him respecting nautical enterprises. In the year 1584 he went as chaplain to the English embassy to Paris, where he had Laudonnière's manuscript narrative of the discovery of Florida printed, first in French and afterwards in English, at his own expense. On his return to England, with the assistance of sir Walter Raleigh, he began to collect materials for the history of the discoveries made by his countrymen. He published the fruits of his researches, in notices of more than 200 voyages, under the title *Principal Navigations, Voyages, Traffiques, and Discoveries of the English Nation*, (Lond. 1589; new edit., 5 vols. Lond. 1809–12). Government rewarded him by bestowing upon him a prebend in Westminster abbey, and a living in Suffolk. A work entitled *A Selection of Curious, Rare, and Early Voyages and Histories of Interesting Discoveries*, etc., chiefly published by Hakluyt, or at his suggestion, but not included in his celebrated compilation (4to, Lond. 1812), forms a supplement to the above works. He died in 1616, and was buried in Westminster abbey. Hakluyt's unpublished manuscripts were made use of by Purchas in his *Pilgrims*. An

island in Baffin's bay was named after him by Bylot, and a promontory in Spitzbergen by Hudson. The *Hakluyt Society*, instituted in 1846, likewise took its name from him. Its object is the publication of all the histories of the earlier voyages and travels.

HAKODA'DI, or HAKODATE, the most northern of the opened ports of Japan, situated in 41° 40′ n. lat., and 141° 15′ e. long. The town stretches 3 m. along the base of a lofty promontory, which juts out into the strait of T'zagar, from the southern extremity of the island of Yesso. It is connected with the mainland by a low alluvial isthmus, and separated from the mountainous region to the n. by a plain bordered by an amphitheater of hills. The adjacent scenery is striking and picturesque, closely resembling that of Gibraltar. Hakodadi was ceded to the Tycoon by the prince of Matsumai in 1854. It was then a poor fishing-village, but has now become a place of importance. The houses are of a single story, fragile wooden buildings with single roofs, which are retained in their places by cobble stones. Each house has on its roof a tub filled with water for use in case of fire. The streets are between 30 and 40 ft. wide, clean, well-drained, and macadamized. In June 1869, after the revolution, the Mikado's forces attacked Hakodadi, which was occupied by the rebels, and a great part of the town was laid in ashes. Considering the latitude of Hakodadi, its climate is severe, and during its winter season the thermometer has been found to indicate 18° below zero. The observations of 1859 make its summer very nearly correspond to that of Edinburgh. The snow disappears about the beginning of April (though it often lies on the mountains until midsummer); and torrents of rain, brought up from the Pacific by the s.e. wind, quickly deluge the recently snow-denuded ground. Hakodadi is said not to be healthy, and yet longevity is frequent. The harbor is one of the finest and largest in the world, but difficult of access. It is divided into an outer and an inner harbor. By art. 3 of the treaty of Yedo (Aug. 26, 1858), Hakodadi was, together with Kanagawa and Nagasaki, opened to foreign commerce from July 1, 1859. It maintains commercial intercourse with all the large ports of Japan; a monthly steamer of the Pacific Mail runs to Yokohama. In 1869 the imports were $789,325; the exports, $990,710; but in 1871 they were much reduced. In 1877 the imports had only a value of $15,000, while the exports were valued at $430,000. Fish, oil, and fish-manure are the chief exports. There is a large fluctuating population connected with the fisheries. The registered Japanese population of the town in 1872 numbered 14,633. In 1877 there were 84 foreigners resident in Hakodadi, of whom 23 were British.

HAL, a t. of Belgium, in the province of South Brabant, on the Senne and the Charleroi canal, 10 m. s.e. of Brussels. It is a station on the Mons railway. The church of St. Mary is a rich Gothic edifice, containing a chapel resorted to by pilgrims on account of a black miracle-working wooden image of the virgin, 2 ft. high, which has acquired enormous wealth from the offerings of pious devotees. The high altar has a marble reredos, unequaled in the Netherlands, carved by Mone, a native artist, 1533. The town has breweries, tanneries, distilleries, several mills, and manufactures of wicker-work and articles of wood. Pop. '70, about 8,000.

HALACHA (rule) is the general term for the Jewish oral law, which runs parallel with the written law contained in the Bible, and is supposed to be like this, of divine origin. Its relation to the ordinances contained in the Pentateuch is that of an amplified code to the fundamental, religious, and civil maxims—such as the changes wrought by time in the inner and outer relations of a rapidly increasing people would of necessity produce. Handed down through a long chain of highest authorities (Sinaitic revelation, Moses, Joshua, Elders, Great Synagogue [Ezra], etc.), it could only be treated and further developed by the foremost men of each generation—such, in fact, as through their eminence in learning belonged to a kind of aristocracy of mind (Chachamim, Wise Men), towering above the multitude (Hediotim, idiots). Their decision on all ordinances involved in contradictory traditions was final, because it was believed to spring from a deeper apprehension of Scripture. Often, indeed, they had recourse, in order to give their opinion a greater weight, to certain special letters, words, and even signs in the Scripture, which, seemingly superfluous where they stood, were supposed to point to the injunction under discussion. Halacha embraces the whole field of juridico-political, religious, and practical life, down to its most minute and insignificant details. Originally, as we said, the oral law, by way of eminence, it began to be written down when the sufferings, to which the Jews were almost uninterruptedly subjected from the first exile downwards, had made many portions of it already very uncertain and fluctuating, and threatened finally to obliterate it altogether from memory. The first collection of laws was instituted by Hillel, Akiba, and Simon b. Gamaliel: but the final reduction of the general code, Mishna (q.v.), is due to Jehudah Hanassi, 220 A.D. Later additions to this code are formed by the Baraithas and Toseftas. Of an earlier date with respect to their contents, but committed to writing in later times, are the three books (Midrashim): Sifra or Thorath Kohanim (an amplification of Leviticus), Sifri (of Numbers and Deuteronomy), and Mechiltha (of a portion of Exodus). The masters of the Mishnaic period, after the Soferim, are the Thanaim. These were followed by the Amoraim, who, by discussing and further amplifying the Mishna, became the authors of the Gemara (q.v.), a work extant in two redactions—that of Palestine and of Babylon. The Halacha was

further developed in subsequent centuries by the Saboraim, Geonim, and the authorities of each generation. See also MIDRASH, MISHNA, TALMUD.

HALAS', a t. of Hungary, in the district of Little Cumania, is situated on the lake of Halastó, about 80 m. s.s.e. of Pesth. It had, '69, 13,127 inhabitants, who are employed chiefly in agriculture and the cultivation of the vine.

HALBERD, or HALBERT, a weapon borne, up to the close of the 18th c., by all sergeants of foot, artillery, and marines, and by companies of halberdiers in the various regiments. It consisted of a strong wooden shaft about 6 ft. in length, surmounted by an instrument much resembling a bill-hook, constructed alike for cutting and thrusting, with a cross-piece of steel, less sharp, for the purpose of pushing; one end of this cross-piece was turned down as a hook, for use in tearing down works against which an attack is made. The honor of inventing of the halberd is contested by the Swiss and Danes, but probably each produced something resembling it. Its name appears to be derived from the Teutonic *hild*, battle, and *bard*, axe. The halberd appears first in England about the time of Henry VIII., and maintained its position for upwards of two centuries. Now, it is rarely seen except on certain ceremonial occasions.

HALBERSTADT, an ancient and quiet t. of Prussian Saxony, in the government of Magdeburg, and 30 m. s.w. of the city of that name, is situated amid fruitful plains on the Holzemme, a tributary of the Saal. It is well built; its streets are for the most part long, broad, and tolerably straight; and among its most notable buildings are the church of Our Lady (1005–1284), in the Byzantine style, and the cathedral, an elegantly proportioned Gothic edifice, begun in the middle of the 13th c., and dedicated to St. Stephen. Halberstadt has two good libraries, and numerous collections of paintings, coins, and antiquities, which, together with the poetical society (Dichterverein), formed by the poet Gleim, have had the effect of maintaining here a lively appreciation for the arts and sciences. The manufactures are woolen and cotton fabrics, leather, soap, gloves, tobacco, and cigars; brewing and oil-refining are also carried on extensively. Pop. '75, 27,800.

HALBIG, JOHANN, b. Bavaria 1814; a sculptor educated in the Munich academy and professor of statuary in that institution. Since 1846 he has modeled more than 1,000 works, chiefly busts. The most notable are the lions at the gate of victory, Munich; a group of figures representing the states of the German empire in the hall of independence in Kelheim; *Christ on the Cross*, in Munich, and an allegorical group, *North America*, for a citizen of New York. In 1873 the king of Bavaria directed him to make a colossal group representing the crucifixion, to be placed on a mountain near Oberammergau.

HALCYON DAYS, a name given by the ancients to the seven days which precede and the seven which follow the shortest day, on account of a fable, that during this time, while the halycon bird or kingfisher was breeding, there always prevailed calms at sea. From this the phrase "halcyon days" has come to signify times of peace and tranquillity.

HALCYON'IDÆ. See KINGFISHER.

HALDANE, JAMES ALEXANDER, 1768–1851; a brother of Robert, and like him, passionately fond of a seaman's life. In 1793 he became the commander of the *Melville Castle*, but before the ship sailed a radical change took place in his religious character. Resolving to imitate his brother's example he sold his command for £9,000, and his interest in the ship and stores for £6,000, and with this fund of £15,000 retired with his wife to Scotland, giving his chief attention to religious concerns. Having obtained personal peace of mind, he spent much time in devising and prosecuting plans of usefulness. He organized many Sabbath schools, and preached extensively in the villages and large towns of Scotland. In company with John Campbell, the African traveler, he itinerated through the land as far as Orkney, and as congregations were gathered by their labors they were provided with houses of worship by the liberality of his brother Robert. He finally became the stated pastor of Leith Walk tabernacle, Edinburgh, and for 50 years performed there, without salary, all the duties of a minister. He also wrote and published: *Social Worship of the first Christians; Man's Responsibility and the Extent of the Atonement; Exposition of Galatians; Inspiration of the Scriptures.*

HALDANE, ROBERT, 1764–1842; an eminent philanthropist of Scotch descent, b. in London. He inherited a large property, but, having a passion for the sea, entered the navy, where he served with honor, 1780–83. When the French revolution commenced he regarded it with pleasure and hope, but was soon disappointed by its excesses. Having, after a season of doubt, become convinced of the divine origin of Christianity he heartily embraced it, and resolved to devote his life and fortune to its advancement. Selecting India as a field for missionary operations, he engaged the co-operation of several ministers to whom he pledged a sufficient support; but as the East India company refused to sanction the enterprise it had to be given up. He then resolved to work at home, sold his estate for 70,000 guineas, which he invested in the public funds, and, limiting himself and family to £500 per annum, devoted the remaining £5,500 of the income to the prosecution of his religious work. In company with Rowland Hill and other zealous men, he was very successful in awakening throughout Scotland a

deep interest on the subject of religion. But the unusual methods of work which they adopted, excited the opposition of the Scottish general assembly. Field preaching was forbidden, and other features of the revival were disapproved. Finding it impossible to submit to such restraint, Mr. Haldane seceded from the established church, and at his own cost erected tabernacles for public worship in many of the large towns of Scotland. At his expense, also, 300 young men were educated for the ministry under several eminent teachers. He established a theological seminary in Paris, and engaged in personal labors in promoting religion in the s. of France and in Switzerland. By his work in Geneva, a new impulse was given to evangelical Christianity, and an important theological school was established. His attention was directed also to missionary work in Africa, and as a beginning he had 30 children brought to England from Sierra Leone to be educated, giving a bond for £7,000 to meet their expenses. From this, however, he was relieved by friends of the cause in London. Besides accomplishing so much by gifts of money, and by personal labor in preaching and itinerating, he wrote several practical works, among which are: *The Evidence and Authority of Divine Revelation; Verbal Inspiration; An Exposition of the Epistle to the Romans.*

HALDEMAN, Samuel Stehman, b. Penn., 1812; educated at Dickinson college; in 1836 assistant in the geological survey of New Jersey, and the next year in the same service in Pennsylvania. In the university of Pennsylvania he was professor of natural history in 1851, and at a later period in the same capacity in Delaware college. At present he is professor of comparative philology in the Pennsylvania university. Some years ago he discovered the oldest fossil stone known up to that period. He has published many special papers on scientific themes, and in 1858 he issued *Analytical Orthography.*

HALDIMAND, a co. in the province of Ontario, Canada, near the e. end of lake Ontario, intersected by the Grand Trunk, the Great Western, the Canada Southern and the Hamilton and Lake Erie railroads; 475 sq.m.; pop. '71, 24,851. Seat of justice, Cayuga.

HALE, a co. in w. Alabama, on the Black Warrior river, crossed by the Alabama and Chattanooga railroad; 600 sq.m.; pop. '70, 21,792–16,990 colored. The surface is undulating, and a large portion is covered with forests, soil fertile, producing cotton, corn, etc. Co. seat, Greensborough.

HALE, Benjamin, D.D., 1797–1863; b. Mass.; graduated at Bowdoin college, and became principal of Saco academy. He studied theology at Andover, was a Congregational minister in 1822, and the next year a tutor in Bowdoin college; afterwards professor of chemistry and mineralogy at Dartmouth. From 1836 to 1858 he was president of Geneva (N. Y.) college. While at Dartmouth he took orders in the Protestant Episcopal church. He published *Introduction to the Mechanical Principles of Carpentry; Scriptural Illustrations of the Liturgy,* and sermons and addresses.

HALE, David, 1791–1849; b. Conn. When young he taught school in Boston; in 1815 went into business, but failed; in 1827 settled in New York and became one of the editors of the *Journal of Commerce,* and subsequently one of the chief proprietors. He was an advocate of free trade. He was noted for liberality and benevolence in religious enterprises, and himself purchased the building known as the Broadway Tabernacle, and established there an orthodox Congregationalist church.

HALE, Edward Everett, b. Boston, 1822; graduated at Harvard in 1839, and in 1846 became pastor of a Unitarian church in Worcester, Mass., whence he went to the south Congregational (Unitarian) church, Boston. Among his works are *The Rosary; Sketches of Christian History; Kansas and Nebraska; Letters on Irish Emigration; Ninety Days' Worth of Europe; Sybaris and Other Homes; How to Do it; Ingham Papers; Reformation; Level Best, and other Stories; Ups and Downs; Christmas Eve and Christmas Day; In His Name; Our New Crusade; Workingmen's Homes.* In addition to these he edited an edition of Lingard's *History of England;* was editor of the *Christian Examiner,* organ of the Unitarian body, and founded *Old and New,* a monthly magazine whereof he was the sole editor.

HALE, Eugene, b. Me., 1836; studied law, and was admitted to practice in 1857. For 9 years he was attorney for Hancock county. In 1867–68 he was a member of the legislature; in the latter year he was elected to congress, and was four times afterwards re-chosen, serving 10 years in all. He has long been prominent as a leader of the republican party.

HALE, John Parker, b. N. H., 1806; d. 1873; a statesman. He graduated at Bowdoin college in 1827, and settled at Dover, which was his home for the rest of his life. He was admitted to the bar in 1830, represented the town in the state legislature in 1832, and in 1834 he received from president Jackson the appointment of U. S. attorney for the district of New Hampshire. He held the office until 1841, when he was removed by president Tyler. In 1843 he was elected to congress as a democrat to fill a vacancy. In 1844 he was nominated by his party for re-election, in spite of his well-known opposition to the extension of slavery. The New Hampshire legislature in the summer of 1844, having passed a resolution instructing the members of congress from that state to vote for the annexation of Texas, Mr. Hale addressed a letter to his con-

stituents in which he declared that, as the annexation of Texas was designed to extend and perpetuate slavery, he could not conscientiously vote for the measure. The democratic state convention thereupon struck his name from the ticket and nominated another man in his stead. He ran as an independent candidate, but was defeated. In 1846, by a combination of independent democrats and whigs, acting together to resist the extension of slavery, Mr. Hale was elected speaker of the house of representatives, and before the close of the session chosen U. S. senator for six years from Mar. 4, 1847. As a senator he was a zealous opponent of slavery extension and the compromises of 1850. In 1847 the liberty party nominated him for president, but he declined, and in the election of 1848 supported Van Buren and Adams. In 1852 he was the free-soil candidate for president, and received 157,685 votes. On retiring from the senate in 1853, he entered upon the practice of the law in New York, but in 1855 he was again elected to the U. S. senate to fill a vacancy. In 1858 he was re-elected for a full term of 6 years, during which he was an ardent supporter of the administration of Mr. Lincoln, taking an active part in the legislation necessary to the vigorous prosecution of the war. At the close of his term in 1865, he was appointed minister to Spain. He was recalled by president Grant, and returned home in 1870. Soon afterwards he suffered an attack of paralysis, from which he never recovered. In 1873 his hip was dislocated by a fall, which hastened his death.

HALE, Sir MATTHEW, a distinguished lawyer, b. in 1609 at Alderley, Gloucestershire. In his 5th year he lost his parents, and was brought up by a kinsman of strict Puritan principles, and intended for the church. He was sent to Oxford university at 16, and was of studious disposition till a company of strolling-players visited that seat of learning, when the long pent-up passions of youth were suddenly let loose, and in this vagrant company he gave way to a good deal of dissipation, and at last was about to enter the army. But just at that time he became involved in a litigation about his patrimonial estate, and paid a visit to London to see sergeant Glanvil, then a leading lawyer, on that subject. The sergeant turned young Hale's ambition into a new direction; and ultimately, in 1629, the latter entered the society of Lincoln's Inn, and was in due course called to the bar. He had by that time renounced gay company, and became a great student, and soon acquired considerable practice. When the long parliament began to meet, he was of considerable reputation; and having cautiously refrained from committing himself to either of the great parties, both sought to enlist him in their service. But he declared for neutrality—conduct which lord Campbell pronounces cowardly and selfish. When, however, the parliament triumphed, Hale signed the solemn league and covenant, and sat in the assembly of divines at Westminster, tried to bring about a settlement between the king and parliament, and ultimately took his engagement to the commonwealth, and was made a judge under Cromwell in 1653, having overcome his natural scruples about serving a usurper, on the plea of necessity. He acted as a *puisne* judge of the common pleas till Cromwell's death, but refused to have his commission renewed by Richard Cromwell, and then entered parliament. On the restoration, he was made chief baron of the court of exchequer; and after 11 years, was transferred to the chief-justiceship of the court of queen's bench. He was reckoned the best judge of his time, being acute, learned, and sensible, and set his face against bribery, one of the vices of the age. John Bunyan was brought before him, and convicted of frequenting conventicles; and when Bunyan's wife afterwards moved for her husband's discharge, she was politely dismissed without redress. Hale also sentenced some women, convicted of witchcraft, to be executed, avowing his full faith in the delusion of that age, that this was a grave and dangerous offense. During his career as a judge, Hale led an austere and scholarly life, leaning to the side of the Puritans. He made a friend of Richard Baxter, and has left a great reputation for piety. He wrote some legal works, which are still of the highest authority, and he bequeathed several valuable legal MSS. to Lincoln's Inn, which are still treasured there. He resigned his office from ill health in 1676, and died on Christmas day of that year.

HALE, NATHAN, 1755–76; b. Conn. He was a school teacher, but after the Lexington fight he joined the revolutionary army, and soon became a captain. At New York, in Sept., 1776, he and one associate at midnight took an English sloop laden with provisions from under the guns of a vessel of war. After the battle of Long Island, Hale offered to undertake a visit to New York city, to learn the British strength and plans. He was successful for some time, but was captured while returning to Washington's camp, and was taken to sir William Howe, who ordered his execution the next morning. Hale was denied the visit of a minister and was refused the use of a Bible. The letters he wrote to his mother were destroyed, and Hale died saying that "he lamented that he had but one life to lose for his country."

HALE, NATHAN, 1784–1863; b. Mass.; graduated at Williams college; studied law, and was admitted to the bar in 1810. In 1814 he and Henry D. Sedgwick edited the *Weekly Messenger*. In the same year Hale bought the *Daily Advertiser* of Boston, the first regular daily journal in the eastern states. The *Advertiser* was whig and afterwards republican in politics, and in his paper Hale opposed the admission of Missouri (with slavery), in 1820, and opposed the pro-slavery bill of 1834. In 1828 he published a book arguing for protection to home industry. He was also an early advocate and

promoter of railroads. He was in both branches of the legislature, a member of two constitutional conventions, and belonged to various scientific societies.

HALE, SARAH JOSEPHA, American authoress, was b. at Newport, N. H., 1795; her maiden name was Buell. Married to David Hale, an eminent lawyer, about 1814, she pursued with him a regular course of study until his death in 1822, when she devoted herself to authorship, and produced her earliest work, *The Genius of Oblivion, and other Poems* (Concord, N. H., 1823), followed by *Northwood, a Tale of New England* (Boston, 1827). In 1828 she removed to Boston, and edited the *Ladies' Magazine*, monthly, until 1837, when it was united with the *Ladies' Book*, Philadelphia, in which city she has since resided. Besides her labors as editor, she has written *Sketches of American Character; Traits of American Life; Flora's Interpreter; Good Housekeeping; Groszenor, a Tragedy* (founded on the story of col. Hayne, a martyr of the revolution); *The Judge, a Drama of American Life;* three metrical romances (entitled *Alice Ray; Three Hours, or The Vigil of Love;* and *Harry Grey*); and her most important work, *Woman's Record*, or sketches of all distinguished women from the creation to 1854 (2d edition, New York, 1855). All her works are characterized by good taste, and her tales and poems by vivid description and strong pathos.

HALES, ALEXANDER OF. See ALEXANDER OF HALES, *ante*.

HALES, STEPHEN, an English natural philosopher, was b. at Beckesbourn, in Kent, in 1677, and died at Teddington, in Middlesex, in 1761. He entered Bene't (now known as Corpus Christi) college, Cambridge, in 1696, was elected fellow in 1702, and having taken holy orders, was presented about 1710 to the perpetual curacy of Teddington, where the remainder of his life seems to have been spent.

His first important publication was *Vegetable Staticks, or an Account of some Statical Experiments on the Sap of Vegetables* (1727), which rapidly acquired so high a reputation as to be translated into French, German, Dutch, and Italian, and which may be considered the starting-point of our true knowledge of vegetable physiology. A second part of this work, under the title *Hæmastaticks*, and treating of the circulation of the blood, appeared in 1733. Besides other independent works, he contributed numerous memoirs to the *Philosophical Transactions* on ventilation, on the methods of keeping water fresh, on electricity, on the analysis of the air, etc. His ventilating machines were introduced into the London prisons, and were found most efficacious in diminishing mortality among the prisoners. His system was also adopted in France with similar good results.

His improvements in the mode of collecting gases did much to facilitate the subsequent labors of Black, Priestly, and Lavoisier.

HALÉVY, JACQUES FRANÇOIS FROMENTAL, a French composer, was b. at Paris, of Jewish parentage, May 27, 1799. He studied under Berton and Cherubini, and afterwards at Rome. The first work of Halévy's that brought him any considerable reputation was *La Juive*, produced at the grand opera in 1835. The most important of his subsequent pieces (of a serious character) were: *La Reine de Chypre; Charles VI.; Le Juif Errant;* and *La Magicienne*. Those executed for the Opéra Comique are regarded as his most successful; the principal are: *Les Mousquetaires* (probably his master-piece), *L'Eclair*, and *Le Val d'Andorre*. He was a great favorite with his countrymen; but his style was so purely national, that, in spite of his great dramatic power, he did not enjoy a great celebrity out of France. Halévy died in Mar., 1862.

HALÉVY, LÉON, b. Paris, 1802, brother of the composer. He became a supporter of St. Simon, and one of the founders of *Le Producteur*. In 1831 he was adjunct professor of literature in the polytechnic school, and in 1837–57 was prominently connected with the bureau of historical monuments in the ministry of the interior. Among his works are *Fables*, *La Grece Tragique*, a resumé of Jewish history; *Luther on the Diet of Worms*, and *Electre*, a drama.

HALÉVY, LUDOVIC, b. Paris, 1834; son of Léon. He was for several years employed in the ministry of the state, and in the colonial office as chief of bureau; but he is known principally by his dramatic works, among which are libretti for the operas of *Orphée aux Enfers; La Belle Hélène; Barbe-Bleue; La Grande Duchesse; La Périchole*, and *Frou-Frou*.

HALF-BLOOD, i.e., persons related through one parent only. When two persons have the same father, but not the same mother, they are called brothers or brother and sister consanguinean; when they have the same mother only, they are called brothers, etc., uterine. In the succession to real or landed property in England, the half-blood relations by the father's side succeed after the full-blood relations; and next, but at a considerable interval, the half-blood relations by the mother's side. In Scotland, also, the half-blood consanguinean succeed to heritable estate in the same way, though not in identically the same order; but the half-blood uterine never succeed in any event. In England, as regards personal estate, the half-blood on both sides succeed indiscriminately, and share equally with the full-blood. But in Scotland, the half-blood only succeed to movable estate after all the full-blood and their descendants are exhausted, and then the half-blood by the father's side succeed in exclusion of the half-blood by the mother's side, who do not come in until the succession reaches a distant

point, viz., where the nearest relations are uncles and aunts paternal, or their descendants, in which case only the half-blood uterine after the mother's death take half the property, and the paternal relatives the other half. See Paterson's *Comp. of E. and S. Law*.

HALFORD, Sir Henry, 1766–1844; b. England; educated at Rugby and Oxford, and in 1794 became a fellow of the college of physicians, and soon gained extensive practice in London. In 1809 he was created a baronet, and was subsequently physician to the Georges III. and IV., to William IV., and finally to queen Victoria. He was president of the college of physicians in 1824. He published *Essays and Orations; The Death of Some Eminent Persons of Modern Times*, and some translations.

HALF-PAY, an allowance given in the British army and navy to commissioned officers not actively employed in the rank to which the half-pay has reference. It corresponds to the French *demi-solde*, or pay of *non-activité*. It has long been a disputed point whether half-pay is given to officers as a retaining fee, to keep them at hand for the time when their services may be again required, or an award on account of services already rendered; but whatever the terms of the original grant, there can be little doubt that, under the present regulations, half-pay, except when distinctly named *retired* half-pay, is in the nature of a retaining fee. This allowance is on quite a different footing in the navy and army.

In the royal navy of Great Britain, officers are merely appointed to serve during the period a certain ship is in commission; when this expires, their employment ceases, and they revert to a state of non-activity. As there are always many more naval officers than appointments for them to fill, a considerable number are at all times on the non-effective list. These are placed on half-pay until again called upon to serve; the amount of such half-pay being usually about 60 per cent of the full pay of each grade. Half-pay is thus in the navy a recognized condition for all officers not immediately wanted afloat.

In the British army, the case is different; there, an officer, on joining, is posted to a particular regiment, with which, in theory, he is supposed to serve until removed from it on attaining the rank of general. Consequently, no fund like the naval half-pay list is in any degree admitted. Army half-pay is of two natures—*temporary* half-pay, and (so-called) *permanent* half-pay. The former is limited to officers incapacitated by casual sickness, to those who are without occupation, in consequence of any reduction of the corps in which they were serving, and to those serving in certain staff appointments.

Permanent half-pay can be demanded by any officer who has served for 25 years; it is also given to majors and lieut.-colonels who, after serving for 5 years with a regiment in those ranks, are not re-employed. Since the abolition of purchase and sale of commissions, this last class may be expected, for the sake of promotion in the lower ranks, to increase considerably. The cost of half-pay is already very great; in 1877–78, it was £315,500 for the army. Till lately, a large proportion of the recipients were officers placed on the list at the great reduction after the peace of 1815. The vote for naval half-pay in 1877–78 was £746,341.

The first grant of army half-pay was made in 1698 by William III.

HALF-PAY (*ante*), a system in Great Britain of pensioning worn-out officers and those too old to do service in the army and navy, and in some cases in the civil service. There is not precisely this system or practice in the United States, but there is sometimes a distinction between officers on active duty and those awaiting orders, while officers are retired on a proportionate amount of full-pay, according to length of service. These are some of the cases. In the navy:

Officers.	At Sea.	On Shore.	Waiting Orders.
Admiral	$13,000	$13,000	$13,000
Vice-admirals	9,000	8,000	6,000
Rear-admirals	6,000	5,000	4,000
Commodores	5,000	4,000	3,000
Captains	4,500	3,500	2,800
Commanders	3,500	3,000	2,300
Lieutenant-Commanders	2,800	2,400	2,000
Lieutenants	2,400	2,000	1,600
Masters	1,800	1,500	1,200
Ensigns	1,200	1,000	800
Midshipmen	1,000	800	600
Cadet Midshipmen	500	500	500
Mates	900	700	500
Chief Medical Officers, Paymaster, and Chief Engineer	2,800	2,400	2,000
Chaplains	2,500	2,000	1,600
Boatswains, Gunners, Carpenters, and Sail-makers	1,200	900	700
Naval Constructors	3,200	3,200	2,200

In the army the salaries from maj.gen. downwards are graded as follows:

Officers.	Yearly Pay of Officers in Active Service.					Half-pay of Retired Officers.				
	1st 5 yrs.	After 5 yrs.	After 10 yrs.	After 15 yrs.	After 20 yrs.	1st 5 yrs.	After 5 yrs.	After 10 yrs.	After 15 yrs.	After 20 yrs.
Maj.general	$7,500	.....	.....	.....	.....	$5,625	.....	.....	.....	.....
Brig.general	5,500	.....	.....	.....	.....	4,125	.....	.....	.....	.....
Colonel	3,500	$3,850	$4,200	$4,500	$4,500	2,625	$2,887	$3,150	$3,375	$3,375
Lieut.col.	3,000	3,300	3,600	3,900	4,000	2,250	2,475	2,700	2,925	3,000
Major	2,500	2,750	3,000	3,250	3,500	1,875	2,062	2,250	2,437	2,625
Captain (mounted)	2,000	2,200	2,400	2,600	2,800	1,500	1,650	1,800	1,950	2,100
" (not mounted)	1,800	1,980	2,160	2,340	2,520	1,350	1,485	1,620	1,755	1,890
1st Lieut. (mounted)	1,600	1,760	1,920	2,080	2,240	1,200	1,320	1,440	1,560	1,680
" (not mounted)	1,500	1,650	1,800	1,950	2,100	1,125	1,237	1,350	1,462	1,575
2d Lieut. (mounted)	1,500	1,650	1,800	1,950	2,100	1,125	1,237	1,350	1,462	1,575
" (not mounted)	1,400	1,540	1,680	1,820	1,960	1,050	1,155	1,260	1,365	1,470
Chaplain	1,500	1,650	1,800	1,950	2,100	1,350	1,485	1,620	1,755	1,890

HALIBURTON, THOMAS CHANDLER, ex-colonial judge, author, and politician, was born at Windsor, in Nova Scotia, in 1796. His father, the hon. Mr. Justice Haliburton, of Nova Scotia, was descended from an ancient Scottish family. Haliburton received his education at King's college in Nova Scotia, afterwards practiced as a barrister, and became a member of the house of assembly. He was raised to the bench of the common pleas of the colony in 1829, and in 1840 became judge of the supreme court. In 1859 he retired from the bench, and took up his residence in England, which he had always regarded as his mother-country. In 1858 he received the degree of D.C.L. from the university of Oxford, and in 1859 took his seat on the conservative benches of the house of commons as M.P. for Launceston, which he represented until his death. Haliburton is best known as the author of *Sam Slick*, the name of a Yankee clockmaker and peddler, a sort of American Sam Weller, whose quaint drollery, unsophisticated wit, knowledge of human nature, and aptitude in the use of what he calls "soft sawder," have given him a fair chance of immortality. In a subsequent series, the author brings Sam Slick to England as an attaché of the United States legation, and is thus enabled to offer many shrewd and humorous observations on the aspects of British society, especially in regard to the upper classes and their pampered servants. *Sam Slick* has been almost universally read in the United States, where its extravagances are keenly relished. It has enjoyed a wide popularity in England, and has also been translated into many continental languages. Haliburton is also author of the *Letter-bag of the Great Western*, *Wise Saws and Modern Instances*, *Nature and Human Nature*, *Bubbles of Canada*, *Rule and Misrule of the English in America*, and *A History of Nova Scotia*. He died in Aug., 1865, having attained a place and fame difficult to acquire at all times—that of a man whose humor was nurtured in one country, and became naturalized in another; for humor is the least exotic of the gifts of genius.

HALI'BUT, or HOLIBUT, *Hippoglossus vulgaris*, one of the largest kinds of flat-fish (*pleuronectidæ*), in form more elongated than the flounder or the turbot, the eyes on the right side, the upper surface smooth, and covered with small soft oval scales, the color brown, of different shades, the under surface perfectly smooth and white. The halibut, although esteemed for the table, is not to be compared in quality with turbot; its flesh is white and firm, but dry, and has little flavor. It is common on the British coasts; but more abundant in the n. than in the s., and greater numbers are taken by the Orkney fishermen. It is not found in the Baltic, but is plentiful on the coasts of Norway, Iceland, and Greenland, and large quantities are taken on the northern parts of the American Atlantic coast. It is a fish of great value to the Greenlanders, who preserve it for winter use by cutting it into long slips and drying it in the air. Oil is obtained from it in considerable abundance. It attains a great size; specimens have been caught weighing nearly 500 pounds. Other species of the same genus occur in the seas of other parts of the world.

HALICARNAS'SUS (originally called *Zephyria*) was one of the Greek cities of Asia Minor, situated on the Ceramic gulf. It was founded by a colony from Trœzene, and was one of the cities of the so-called Doric Hexapolis, from which confederacy, however, it was eventually excluded. Halicarnassus was the largest and most powerful of the cities of Caria, and by its situation and the inaccessible position of its citadel, was reputed a place of great strength: but the people, owing to the enervating influence of the climate, were of a weak and effeminate character; and during the Persian conquests, readily yielded to the dominion of the conquerors. During this period (about 500 B.C.), however, a domestic tyrant, Lygdamis, rose to supreme power as a vassal of Persia; and under his descendants the city, without forfeiting the Greek character, or ceasing to cultivate the Greek literature and arts, remained faithful to the Persian interest. Artemisia, the daughter and successor of Lygdamis, actually commanded a naval squadron in the fleet of Xerxes, at the battle of Salamis. Alexander the great, provoked by

the obstinacy with which the city held out against him, commanded that it should be destroyed by fire; but the inhabitants took refuge in the citadel, which successfully resisted his arms. The city was afterwards rebuilt, but it never recovered its ancient importance or prosperity. In the days of the Roman empire, it had sunk into comparative political insignificance, its only title to consideration at that time being the celebrated mausoleum, erected in memory of one of the rulers, named Mausolus, by his sister (who had also been his wife and successor) Artemisia. Halicarnassus was the birthplace of two of the most eminent of the Greek historians, Herodotus and Dionysius. The site of the city is occupied by the modern Boudroum. For an account of the discovery of the ancient remains of the city, and of the disentombment of the mausoleum, see MAUSOLEUM.

HALICORE. See DUGONG.

HA'LICZ, a t. of Austria, in the crownland of Galicia, is situated on the Dniester, in a fruitful district in the administrative division of Stanislawow, about 14 m. n. of the town of that name. There are here a convent of the Minorites; a community of Jews of the sect of the Caraites, distinguished for their industry and uprightness; and on the ridge of a hill in the vicinity, the ruins of the once strongly fortified castle of Halicz, which has frequently been the witness of bloody encounters. Halicz, from which Galicia has derived its name, is the oldest town in that crownland. It was built in the 12th c., and its castle was the residence of the rulers of what was formerly the grand principality of the kingdom of Halicz. Pop. '69, 3,142.

HAL'IDON HILL, situated about a mile to the n.w. of the t. of Berwick, in the fork formed by the Whitadder and the Tweed, was the scene of a bloody conflict between the English and Scots, July 19, 1333. Edward III., having determined to support the claims of Edward Baliol to the crown of Scotland, advanced to the borders with a large army and laid siege to Berwick, the governor of which promised to surrender on July 20, if not previously relieved. On the 19th, the acting regent of Scotland, Archibald Douglas, lord of Galloway, surnamed "the Tyneman," with a large force, came in sight of Berwick, and found the English drawn up on the n. side of Halidon Hill. Regardless of fatigue, the Scots immediately advanced to the attack, but while crossing the morass which skirts the base of the hill, suffered severely from the English archers. They nevertheless struggled onwards, and mounted the hill, when the English, charging in a compact body, threw them into irretrievable confusion. A total rout was the immediate result, and the English cavalry and Irish auxiliaries committed a prodigious slaughter among the fugitives; upwards of 10,000 Scots (according to some authorities, 14,000) being left on the field, among whom were Douglas the regent, three of the Stuart family, the earls of Ross, Sutherland, Menteith, Lennox, and Athole, and many others of the nobility. The English loss was compartively small. The town of Berwick immediately surrendered, and Edward Baliol again for a short time kept possession of the throne.

HALIFAX, a co. in North Carolina, on Roanoke and Fishing rivers, intersected by the Wilmington and Weldon, and the Raleigh and Gaston railroads; 630 sq.m.; pop. '80, 30,300—21,138 colored. Much is still covered with forests. The soil is fertile, producing cotton, corn, etc. Co. seat, Halifax.

HALIFAX, a co. in s. Virginia, on the North Carolina border, on Dan river, intersected by the Richmond and Danville railroad; 960 sq.m.; pop, '70, 27,828—16,266 colored. Soil fertile; chief productions: tobacco, corn, wheat oats, and pork. Co. seat, Halifax Court-House.

HALIFAX, a co. in s. Nova Scotia, on the Atlantic coast; area 2,450 sq.m.; pop. '71, 56,963. The region is fairly fertile, and the coast is deeply indented with bays, some of which afford good harbors. Chief town, Halifax (city). There is railroad communication around the bay of Fundy to St. Johns and the United States and Canada.

HALIFAX, the capital of Nova Scotia, stands on the s.e. or outer coast of the peninsula, in lat. 44° 39' n., and lat. 63° 37' west. Though it was founded only in 1749, yet so favorably was it situated, that in 1750 it supplanted Annapolis as the seat of government. The harbor of Halifax is one of the finest in the world. It is entered from the s., extends northwards about 16 m., and terminates in a magnificent sheet of water called Bedford basin, is spacious enough for the entire navy of England, and offers all the year round easy access and safe anchorage to vessels of any magnitude. The harbor has two entrances, made by M'Nab's island, of which the western only is navigable for vessels of large tonnage. Halifax, with its suburbs, extends along the slope of a hill, and is over 2 m. in length, and about three-quarters of a m. in width. The streets are well laid out, and at right angles; and handsome granite and free-stone have superseded wood. The dockyard, covering 14 acres, is among the finest in the British colonies. The principal edifices are the province building (which contains the government offices), Dalhousie college, government house, military hospital, admiralty house, lunatic and blind asylums, provincial penitentiary, court-house, exchange, post office, theater, workhouse, jail, etc. Halifax also contains 24 places of worship, and is the seat of two bishops. It is an important military post, being defended by strong forts and batteries one of which, called the Citadel, stands on the summitt of the hill on which Halifax is

built, and is said to be, after Quebec, the strongest fortification in America. Halifax and Quebec are now the only places in Canada where British troops are retained; the troops occupy extensive and handsome barracks overlooking the harbor. Halifax is the chief naval station for British North America. The head offices of the Nova Scotia railway, and the Nova Scotia electric telegraph company are situated here. It has railway communication with Annapolis, Pictou, St. John, Truro, and Windsor. The port engrosses nearly the whole of the foreign trade of the colony. In the year ending June 30, 1872, the exports amounted to $4,678,684, and the imports to $10,055,579. The population of Halifax at the census of 1871 was 29,582.

HALIFAX, a thriving market-town, municipal and parliamentary borough of England, in the West Riding of Yorkshire, is situated principally on the right bank of the river Hebble, a feeder of the Calder, on the slope of an eminence rising above the river, and is almost wholly surrounded by hills. It is 43 m. s.w. of York, and 217 m. n.n.w. of London. Its situation is pleasing, and its general appearance handsome; while its ample supply of water-power and of coal, its facilities for transport both by water and by leading lines of railway, and its position in proximity to many of the great towns of the north of England, contribute materially to its manufacturing and commercial importance. The ecclesiastical architecture of Halifax strikes every visitor. The parish and Trinity churches, "All Souls," an Episcopalian church completed in 1861 from designs by sir George Gilbert Scott, are fine specimens of Gothic. The "Square Church," belonging to the Congregational body, erected in 1863; and another connected with the same sect, built in 1867, are conspicuous features. The town-hall, opened by the prince of Wales in 1863, is a very ornate erection. The Piece hall, a large quadrangular stone building, erected in 1779, at a cost of £12,000, and comprising 315 apartments or warehouses for the reception and sale of manufactured goods; and the assembly rooms, Mechanics' institute, and theater. Among the numerous public and private educational institutions of Halifax are the Heath grammar school—founded in 1585, with an endowment of £270 a year—and the Blue Coat school. In 1857 Mr. F. Crossley, M.P. for the West Riding, presented a magnificent park to the town. It contains the largest carpet-works in the world. The manufactured goods, besides carpets, are chiefly shalloons, tammies, calamancoes, duroys, everlastings, moreens, shags, serges, merinoes, as well as baizes, narrow and broad cloths, cassimeres, and bombazines. Cotton fabrics, wool-cards, and paper are manufactured. There is also some trade in corn, in mill-machinery, and in raising coal and slate. Pop. '71, 65,510.

A strange old local law, known as the Halifax gibbet law, was enacted here at an early period of the woolen manufacture for the protection of the manufacturers against the thievish propensities of their hands, who were in the habit of robbing their employers by keeping to themselves a portion of the material which ought to have gone into the cloth, so that when manufactured the fabric was discovered to be of inferior weight and body. The gibbet law provided that all persons within a certain circuit, who had stolen property of or above the value of 13½d., were to be tried by the frithburgers within the liberty, and if found guilty, were handed over to the magistrates for punishment, and were executed on the first market-day following by means of an instrument similar to the guillotine. The stage or platform on which the executions took place is still to be seen, and the axe is preserved in the old jail in Jail lane.

HALIFAX, CHARLES MONTAGUE, EARL OF, poet and statesman, grandson of Henry, first earl of Manchester, and nephew of the famous parliamentary general, was b. at Horton, in Northamptonshire, April 16, 1661. He was educated at Westminster school and Trinity college, Cambridge. A laudatory poem on Charles II. first brought Montague into public notice. Two years later appeared the parody on Dryden's *Hind and Panther*, entitled *The Town and Country Mouse*, of which he was joint author with Matthew Prior; but his poetry would hardly have made his name remembered in the 19th century. He almost disappeared from the field of literature after the appearance of his satire, save as the patron of Addison and other men of letters. He had intended to enter the church, as it afforded a regular income, but tempted by the offer of a seat in the house of commons, he became member for Malden in the convention parliament, where he voted for the declaration that James II. had abdicated, and that the throne was thereby vacant. He retained his seat in William III.'s first parliament, and was appointed in 1692 a commissioner of the treasury. On Dec. 15 of this year he proposed, in the house of commons, to raise a million sterling by way of a loan. William required money for his wars —the moneyed classes were tired of bubble companies, and knew not where to invest safely, and the landowners were weary of heavy taxation; so the national debt was established. In the spring of 1694 money was again wanted, and Montague was ready to supply it. This time he did so by originating a national bank, a scheme for which had been laid before the government by William Paterson three years before. The capital was to be £1,200,000, and the shareholders were to be called the governor and company of the bank of England. The bill for this was ultimately passed; the result was immensely successful, and Montague became chancellor of the exchequer. His next work was the recoinage of 1695, which he carried out successfully, appointing Newton warden of the mint, and raising a tax on windows to pay the expense, instead of the obnoxious impost called hearth-money. The interval between the last day on which the

old money was receivable in payment of taxes and the issue of the new coin, was, owing to the absence of a circulating medium, likely to cause much distress; but he obviated this by establishing exchequer bills bearing interest daily, and ranging in amount from £5 to £500. On Godolphin's resignation, in 1697, he became premier, but soon becoming unpopular, was obliged to bestow upon himself the auditorship of the exchequer, and resign his higher offices. Harley insisted on his withdrawal from the commons, and he became baron Halifax, adopting a title which had just become extinct. He was impeached before the house of lords for breach of trust in 1701, and again in 1703, but the proceedings fell to the ground. During the whole of Anne's reign, Halifax remained out of office, but was active in promoting the union with Scotland and the Hanoverian succession. On the queen's death, he was naturally appointed a member of the council of regency, and on George I.'s arrival, became an earl and prime minister. His rule lasted only nine months, being terminated by death on May 19, 1715. Halifax, though an arrogant and mean man and fond of display, was a consistent politician, and one of the greatest financiers of his time.

HALIFAX, MARQUIS of. See SAVILLE, GEORGE, *ante*.

HALIFAX COURT-HOUSE, the seat of justice of Halifax co., Va. It is also called Banister (q. v.), and is on the river of that name, in the midst of a tobacco raising region. Pop. about 700.

HALIFAX RIVER, in Volusia co., Fla.; a tide-water channel running inland 30 m. from Musquito Inlet and continuing s. to Hillsborough river. It is navigable.

HALIM PASHA. See ABD-EL-HALIM.

HALIOTIS, a genus of gasteropodous mollusks, the type of a family, *haliotidæ*, belonging to the order *scutibranchiata*, and having a widely open ear-shaped shell, with a very low spire, and a row of holes not far from the opposite margin over the fissure of the mantle, through which the water gains access to the gill-cavity. The holes are closed as the animal grows, and new ones formed, which first appear as notches along the margin of the shell. The animal, in a living state, exhibits great beauty of colors. It adheres to rocks by a large muscular foot, after the manner of limpets. One species, *H. tuberculata*, is not uncommon on the southern European coasts, and is found on those of the Channel Islands. It is used for food; the shell is also sought after for an ornament, and for the sake of the nacre (q. v.) in which it abounds, and which is much used for mother-of-pearl ornaments, and particularly for ornamenting *papier-maché* articles. The shells of this genus are called *earshells* or *sea ears*. They are the *ormers* of the French. The species are very numerous; the most splendid are natives of warm climates.

HALL, the large principal apartment of the castles and dwelling-houses of the middle ages. The hall is of very ancient origin. The earliest Saxon buildings we have any record of are the palaces of the kings, and these seem to have consisted of one large hall, in which the king, his courtiers or "hearth-men," and all his retainers dwelt together, eating at the same table, and sitting round the same fire; and one other chamber, in which the king and his hearth-men slept, while his retainers slept in the hall. The Normans built their houses on the same plane—with the hall and one solar (q. v.) or sleeping apartment. The same arrangement prevailed, with slight modifications, during the 12th and 13th centuries. In the 14th and 15th centuries, when the country was more settled and prosperous, and manners more refined, more numerous apartments became necessary. The hall, however, still retained its place as the chief apartment. In it the king or the lord of the manor gave audience, administered justice, received and entertained his retainers and guests, and performed all the public acts of feudal life.

At one end of the hall was a raised platform or dais, on which the table of the lord of the manor was placed, and where his more honored guests sat along with him. The retainers sat at a table which ran along the lower part of the hall. This part was not always in the cleanest and sweetest condition, and hence it received the name of "the marsh."

The hall partook of the style of architecture prevailing at the time when it was built, and being a large and important apartment, was generally ornamental in its character. The roofs especially were very carefully and elegantly constructed, as many still remaining show. The hall of the king's palace, now called "Westminster Hall," built by William Rufus, and restored by Richard II., is the finest example in England, being 300 ft. long and 100 ft. broad.

The hall was essentially a part of feudal architecture. When that system gave way, the large common halls were abandoned. Many old ones, however, still remain, but their use is changed.

HALL, as known at the great seats of learning in England is connected with a college though not incorporated nor as a rule endowed. Many years ago there were 500 halls at Oxford, but now there are very few. The number of colleges connected with the great universities in which provision was made for the support of the members was, for many centuries, small in comparison to the halls or inns (*aulæ*, *hospitia*), in which the students lived chiefly at their own expense, and were merely furnished with cheap and convenient lodgings. At the commencement of the 14th c. the number of halls was

about three hundred, while the colleges amounted only to three. For the establishment of a hall, nothing more was necessary than that a few students, on a mutual agreement to live together, should hire a house, find security for a year's rent, and choose for principal a graduate of respectable character. The chancellor or his deputy could not refuse to sanction the establishment, and to admit the principal to his office. The halls were in general held only on lease; but by a privilege common to most universities, the rent was fixed every five years by sworn taxers, two masters, and two citizens; and houses once occupied by students could not be resumed by the proprietors so long as the rent was punctually paid. The halls were governed by peculiar statutes, and were liable to be visited and regulated by the university. The causes which occasioned a diminution in the number of the scholars, diminished also the number of the halls, though that of the endowed colleges continued to increase. At the commencement of the fifteenth century, while the students were diminishing, the colleges had risen to seven. In the beginning of the sixteenth century, the number of halls had fallen to fifty-five, while the endowed colleges had increased to twelve. In 1546 the inhabited halls amounted to only eight; and in 1651, Wood remarks that, "the ancient halls lay either waste, or were become the receptacles of poor religious people turned out of their cloisters."

HALL, a co. in n. Georgia, on the Chattahoochee drained by the 'Oconee, intersected by the Atlantic and Richmond air line railroad; 600 sq.m.; pop. '70, 9,607—1290 colored. The surface is hilly; main products: corn, wheat, and hay. Gold and precious stones have been found.

HALL, a co. in central Nebraska on Platte river, crossed by the Union Pacific railroad; 576 sq.m.; pop. '76, 4,615. It has an undulating prairie surface, and good soil for pasturage. Corn, wheat, and oats are raised. Co. seat, Grand Island.

HALL, a small and very old t. of Austria, in the Tyrol, is situated on the left bank of the Inn, which is here navigable, six m. e. of Innsbruck. Its parish church, built in 1271, with a monument that marks the grave of Spechbacher, the bravest and most skillful leader of the Tyrolese in their struggle for independence; its gymnasium, its Franciscan convent, and its *Münzthurm*, are the chief buildings. About nine m. n. of the town is the Salzberg, with salt mines, from which salt in the form of brine is conveyed to the pans of Hall in wooden pipes. Although the demand is not so great as formerly, upwards of 300,000 cwts. of salt are still produced here. Hall has also manufactures of sal-ammoniac and chemicals. Pop. '69, 5,022.

HALL, Mrs. ANNA MARIA, an eminent novelist, the daughter of a gentleman named Fielding, who died when she was very young, was born in Dublin in 1802. In her 15th year she left Ireland with her mother, and went to reside in London, where her education was completed. In 1824 she married Mr. S. C. Hall, a gentleman well-known for his works connected with the fine arts, and was thus led to become an authoress. Her first work, *Sketches of Irish Character*, published in 1828, at once established her reputation. In 1832 she brought out her first novel, *The Bucaneer*, a story of the time of the commonwealth, in which Cromwell's character is vindicated. Her other works rapidly followed—*Tales of Woman's Trials*, in 1834; *The Outlaw*, a novel of the reign of James II., in 1835; *The French Refugee*, a drama, which in 1836 was acted for about fifty nights at the St. James's theater, London; *Uncle Horace*, 3 vols. 1837; *Lights and Shadows of Irish Character*, 1838; *Marian, or a Young Maid's Trials*, 1839; *The Whiteboy*, 1845, etc. Her *Stories of the Irish Peasantry* appeared originally in *Chambers's Edinburgh Journal*, and were afterwards published in a collected form. She is also the authoress of a graceful fairy tale of love, *Midsummer Eve*, originally contributed to the *Art Journal*, and of a pleasant illustrated series of descriptive sketches, inserted in the same publication, and subsequently published separately under the title of *Pilgrimages to English Shrines*. The last two, with some others of her writings, have been translated into German. Besides assisting her husband in his illustrated work on *Ireland*, etc., she has furnished numerous contributions to the periodicals of the day, and written various books for the young. Of these, *Uncle Sam's Money Box* is one of the best.

HALL, BASIL, Captain, R.N., a distinguished traveler, a younger son of Sir James Hall of Dunglass, was b. in Edingburgh in 1788, and d. at Portsmouth in 1844. He entered the navy in 1802, and became post-capt. in 1817. When lord Amherst was sent on a mission to the court of Pekin in 1816, Hall commanded the *Lyra*, a small gun-brig, which accompanied the expedition, and took the opportunity of visiting some of the places along the coast of the Corea, which were little known to Europeans. The chief results of this exploration were published in a book entitled *A Voyage of Discovery to the Western Coast of Corea and the Great Loo-Choo Island in the Japan Sea* (Lond. 1818), which excited much interest, and passed through at least three editions. Amongst his other works, we may mention *Extracts from a Journal written on the Coast of Chili, Peru, and Mexico, in* 1820—1822 (which forms two of the earlier volumes of *Constable's Miscellany*); *Travels in North America*, in three vols. (a work that was violently assailed by the American press); *Fragments of Voyages and Travels*, in three series, each consisting of three vols. (a work of great interest, and still very popular); and *Patchwork*, in three vols., published in 1841. He was a fellow of the royal societies of London and Edinburgh, and a member of the astronomical society of London. He was the author of

various articles in the scientific journals of the day, and in the *Encyclopædia Britannica*. During the last two or three years of his life he suffered from mental alienation, induced probably by excessive literary work, and was placed in the royal hospital, Haslar, where he remained till his death.

HALL, CHARLES FRANCIS, 1821–71; b. N. H. He was first a blacksmith, then a journalist in Cincinnati, and after that carried on the business of an engraver in the same city. The publication of Dr. Kane's account of the first Grinnell expedition to the arctic regions first awakened his interest in that part of the world, and from that time (1853) to 1860, when he made his first expedition, his leisure was entirely devoted to this engrossing subject. This expedition was the result of his own exertions, and his equipment consisted of two boats, with sledges, the entire outfit being conveyed northward on a small whaler, commanded by capt. Buddington. In spite of the meager character of his resources, the explorer displayed his dauntless and energetic character by his achievements, even in this his first journey. He remained two years in the arctic regions, thoroughly informed himself of the Esquimaux or Innuit habits, continued his exploration until disabled by the loss of his boats, and succeeded in adding 1500 miles of coast line to the charts. Returning home in a whaler, he brought with him "Joe" and "Hannah," two Esquimaux, from whom he continued to receive instructions in the Innuit language, while he made efforts to obtain the necessary means for a second expedition on a larger scale. Through the liberality of Mr. Henry Grinnell, he accomplished his wish, and in 1864 sailed on board the *Monticello*, capt. Buddington. He now passed five years among the Esquimaux, chiefly in King William's land, and at Repulse bay and Pelly bay. The object of these two expeditions was to obtain tidings of the lost Franklin expedition, and in this capt. Hall was so far successful as to obtain many relics of the crews of the *Erebus* and *Terror*. He received much information from the natives, and even gained possession of a skeleton, which was afterwards forwarded to England. Hall returned in 1869, and remained in the United States eighteen months, preparing for the publication of the account of his explorations, delivering lectures, and endeavoring to interest the U. S. government in the prosecution of still another expedition—this time, with the design of reaching the North Pole if practicable. He was fortunate in infusing some of his own enthusiasm into the prominent members of the government, and in 1870 the *Polaris* was fitted out for his use, and sailed on July 3 of that year. Most unhappily, capt. Hall died on Nov. 8, 1871, and the expedition came to an abrupt conclusion. The *Polaris* was abandoned in the ice, and a portion of her crew under capt. Tyson, floated 195 days on a floe, before being rescued. Hall was buried in the ice, on the coast of Greenland. The history of capt. Hall's three expeditions will be found in *Arctic Researches* (1864), and in two volumes published from his manuscripts by order of the U. S. government.

HALL, CHARLES HENRY, D.D.; b. Ga., 1820; educated at Phillips academy, Andover, Mass., and graduated at Yale, soon after which he entered the ministry of the Protestant Episcopal church in Charleston, S. C. After useful service as a rector of a church in Washington, D. C., he became rector of the church of the Holy Trinity in Brooklyn, where his ministry has been noted for vigor, earnestness, and large success. He has published *Commentaries on the Gospels*, *True Protestant Ritualism*, and *Spina Christi*.

HALL, DOMINICK AUGUSTINE, 1765–1820; b. S. C. In 1806 he was district judge in the territory which was afterwards the state of Louisiana, and after the state was organized he continued in the same office until near the time of his death. His name became widely known in consequence of his arrest by gen. Jackson for trying to release by habeas corpus a military prisoner. Jackson was fined $1000 for contempt of court, and paid it. Nearly 30 years later congress repaid the fine with interest.

HALL, GORDON, 1784–1826; b. Tolland, Mass; graduated at Williams college, 1808; ordained at Salem, 1812, and sailed Feb. 18 for Calcutta as a missionary of the A. B. C. F. M. The East India company refusing him permission to remain in its territory he sailed for Bombay, arriving Feb. 11, 1813. Being ordered by the governor-general to leave for England, he presented the cause of the heathen with such power that he was allowed to remain. He possessed great vigor of intellect and force of character, indomitable courage, and a heart consecrated to missionary work. His *Appeal in Behalf of the Heathen*, and *The Conversion of the World*, or *Claims of Six Hundred Millions*, made a profound impression. After laboring 13 years, and completing the revision of the New Testament in Mahratta, he died of cholera, after a few hours' sickness, in Bombay.

HALL, JAMES, 1793–1868; b. Penn.; studied law, but joined the army in 1812, and in the war with Great Britain distinguished himself in engagements at Lundy's Lane, Niagara, and Fort Erie. On the conclusion of the war he accompanied an expedition against Algiers, but in 1818 he resigned his commission, and continued the study of law at Pittsburg. In 1820 he removed to Shawneetown, Ill., where he commenced practice at the bar, and also edited the *Illinois Gazette*. Soon after he was appointed public prosecutor of the circuit, and in 1824 circuit judge. On the abolition of the latter office four years afterwards he was appointed state treasurer, but he continued at

the same time his legal practice, and also edited the *Illinois Intelligencer*. Subsequently he became editor of the *Western Souvenir*, an annual publication, and of the *Illinois Monthly Magazine*, afterwards the *Western Monthly Magazine*.

HALL, JAMES, LL.D., b. Mass. 1811. A distinguished geologist and palæontologist. Intending at first to follow the medical profession, his attention was diverted to natural history, which study he followed in the Rensselaer Polytechnic institute, Troy, N. Y., where he became professor of geology. In 1837 he commenced the series of explorations as one of the geologists appointed for the survey of the state of New York, describing the results of his work in annual reports, the last of these being one of the quarto volumes of the *Natural History of the State of New York*. Being appointed palæontologist to the state of New York, Dr. Hall devoted himself to the preparation of the magnificent series of volumes on that subject, which have been published at intervals since 1847. He also contributed largely to national reports of surveys (Fremont, Stansbury, etc.), and has written voluminously on many important disputed questions in geology and palæontology. The palæontological section of the state cabinet of natural history at Albany, N. Y, was for many years in Dr. Hall's charge.

HALL, JOHN, D.D., b. Ireland, 1829; educated at Belfast college; licensed at 20 years of age to preach, and began as a missionary (Protestant) in the w. of Ireland. In 1852 he was pastor of a Presbyterian church in Armagh, and in 1858 was a minister in Dublin. The queen gave him the appointment of commissioner of education for Ireland. In 1867 he was a delegate from Ireland to the Presbyterian churches of the United States. In 1867 he became pastor of the Fifth avenue Presbyterian church, New York city, where he became so popular that it was found necessary to erect a larger edifice. Dr. Hall has also achieved great popularity as a lecturer. Among his writings are *Family Prayers for Four Weeks*, *Papers for Home Reading*, and *Questions of the Day*. He has a widespread reputation for pulpit eloquence.

HALL, JOSEPH, an English bishop, remarkable for his learning, piety, and misfortunes, was born in 1574 at Ashby-de-la-Zouch, Leicestershire. He was educated at Emanuel college, Cambridge, of which he became a fellow. Entering the church, he became, in 1617, dean of Worcester, was one of the English deputies to the synod of Dort, was consecrated bishop of Exeter in 1627, and in 1641 was translated to Norwich. The latter years of his life were saddened by persecution. He was accused of Puritanism, though he zealously defended the Espiscopacy. By attacking the Arminianism of archbishop Laud, he is said to have "exposed himself to the malignant and wanton attacks of that primate and his crew." In 1641, having joined the prelates who protested against the validity of all laws passed during their forced absence from parliament, he was committed to the Tower, and threatened with prosecution for high treason, but was set at liberty, at the end of seven months, on finding bail for £5,000. On his return to Norwich, he found his revenues sequestrated and his property pillaged. He rented a small farm at Higham, near Norwich, to which he retired, 1647, and died in 1656, aged 82 years. His works, mostly of a controversial character, have been published in folio quarto, and octavo. A new edition, with autobiography, notes, etc., was published by the Rev. Josiah Pratt (Lond. 10 vols. 1808); a later edition by the Rev. Peter Hall, a descendant of Joseph (Oxford, 12 vols. 1837–9). His writings most interesting at the present time are poetical *Satires*, written at college, which Pope, no mean judge of that species of composition, affirms to be "the best poetry and the truest satire in the English language." Hallam, however, (*Lit. Hist. of Europe*), accuses him of being "harsh and rugged," and asserts that "his lines frequently bear no visible connection in sense or grammar with their neighbors." Among his other works are *Contemplations*, *Art of Divine Meditation*, and *Enochismus, or Treatise on the Mode of Walking with God*.

HALL, LYMAN, 1725–90; b. Conn.; a signer of the declaration of independence; graduate of Yale and a physician. He was a member of congress from Georgia, and governor in 1783. While Georgia was subject to English rule his entire property was confiscated.

HALL, MARSHALL, an eminent physiologist and physician, was b. at Basford, Nottinghamshire, in 1790, and died at Brighton in 1857. At the age of 20 (having been previously apprenticed to a chemist) he entered on the study of medicine at the university of Edinburgh, where, in 1812, he took his degree of M.D. After three years' subsequent attendance at the leading schools of medicine on the continent, he commenced practice in Nottingham in 1815, and rapidly obtained a high provincial reputation. In 1826 he removed to London, where his career as a physician was so successful, that he was enabled at the age of 60 to release himself from strictly professional labor. Among his contributions to physiology must be mentioned his *Essay on the Circulation of the Blood*, published in 1831, in which he made known his discovery of the remarkable "caudal heart" connected with the vessels in the tail of the eel; his paper "On the Inverse Ratio which subsists between the Respiration and Irritability in the Animal Kingdom," in the *Philosophical Transactions* for 1832; and the articles "Hybernation" and "Irritability" in Todd's *Cyclopædia of Anatomy and Physiology*. But his name is best known in connection with the doctrine of the reflex function of the nervous system,

which was his most engrossing subject of pursuit for the last twenty-five years of his life. In the *Philosophical Transactions* for 1833 appeared his "Memoir on the Reflex Function of the Medulla Oblongata and Medulla Spinalis." His views on the subject of this memoir were extended and corrected in various publications, amongst which may be especially mentioned his *Lectures on the Nervous System and its Diseases* (1836), *Memoirs on the Nervous System* (1837), *New Memoir on the Nervous System* (1843), and *Synopsis of the Diastaltic Nervous System* (1850). There has been much discussion as to Hall's claims to be considered the discoverer of reflex action. He admitted that the phenomena of which he treated had been long known to physiologists, but he believed himself to have been the first to show their independence of sensation, to bring them together under one generalization, to establish with precision the laws of their production, to assign them their just rank in physiology, and to apply the doctrine to the elucidation of disease. His more strictly professional writings are many and valuable; they appear partly as independent publications, and partly in the medical journals. His last bequest to the science of medicine and the cause of humanity, was the description of a simple and easily applied method of restoring suspended respiration, which has been the means of saving many from untimely death, and is known as THE MARSHALL HALL METHOD. It is briefly described in the article ASPHYXIA. His memoirs, with a large collection of his letters, have been published by his widow.

HALL, NEWMAN, LL.B.; b. England 1816; an English clergyman, having a charge at Hull, and later, pastor of the "Rowland Hill" chapel in London. He was a firm advocate of the union cause during the war of the rebellion in the United States, coming here, speaking in the loyal interest, and preaching before congress. In 1866 he was president of the Congregational union. He is widely known as an earnest advocate of total abstinence, upon which he has delivered many sermons and lectures. In 1873 he made a second American visit and lectured in many of the large cities. Some of his works are *The Christian Philosopher, The Land of the Forum and the Vatican, Lecture on America, From Liverpool to St. Louis, Pilgrim Songs*, etc.

HALL, Rev. ROBERT, a celebrated English dissenting preacher and writer, was b. at Arnsby, near Leicester, May 2, 1764. He was the son of a Baptist minister of some note as a preacher and author of religious works, and was the youngest of fourteen children. He was feeble in body and precocious in intellect, learning to read almost as soon as he could speak, from the tombstones of the churchyard, his playground. At the age of 15, he was sent to a Baptist academy at Bristol, when he gave promise of his future fame as an orator, but, from his nervous organization, broke down in his first public efforts. In 1781 he entered King's college, Aberdeen, where he remained four years. An intimate companionship with Mackintosh, in which they read and discussed together philosophy and theology, was of great service to him. Graduating in 1785, he became, at the age of 21, assistant Baptist minister and tutor in the academy at Bristol. He was a fluent, rapid, and impressive speaker, and was liberal, but not heterodox in his religious views. In consequence of a disagreement with his colleague, he went in 1790 to Cambridge, where, by his elaborate composition and vivid eloquence, he rose to the highest rank of British orators. He is not less distinguished for his writings and published discourses, than as a pulpit orator. His *Apology for the Freedom of the Press*, 1793, and sermon on *Modern Infidelity*, extended his reputation. In 1806 he settled in Leicester; married in 1808, after a whimsical courtship; returned to Bristol in 1825, and died Feb. 21, 1831. He was an indefatigable student, learning Italian at 60, that he might enjoy Dante, and full of wit, fun, and a spontaneous eloquence, so that the style of his improvisations was superior to that of his writings. Nearly all his life he suffered the tortures of an obscure disease of the spine; he had at times attacks of insanity, and his death was preceded by great agony, caused by a large calculus in one of his kindeys; yet few men have performed more intellectual labor. A complete edition of his works, with a memoir by Dr. O. Gregory, and observations on his character as a preacher by John Forster, was published at London, in 6 vols., 1831–33; 11th edition, 1853.

HALL, SAMUEL CARTER; b. England 1800; studied law, but turned his attention to literature. He was a reporter of parliamentary debates, and afterwards editor of Colburn's *New Monthly Magazine*. For several years, with the able assistance of his wife, he wrote and complied the *Annuals* once so popular in England and America, and many other works. In 1839 he edited the *Art Journal*. Among his works are *A Book of Memoirs of Great Men and Great Women, Book of British Ballads, Baronial Halls*, etc. Mr. Hall has always been devoted to charitable objects, and has assisted in the foundation of eminent public establishments of this character.

HALL, or SWÄBISCH-HALL, an old and picturesque t. in the kingdom of Würtemberg, is very beautifully situated in the deep valley of the Kocher, 35 m. n.e. of Stuttgart. It is surrounded by a ditch and by high walls surmounted with towers. Like other places in whose names the word Hall or Salz occurs, Hall has considerable saltworks, which, together with those of Wilhelmsglück, produce annually nearly 80,000 cwts. There are also tan-works, soap-works, and manufactoires of cotton goods and *bijouterie*. Pop. '75, 8,430.

Hall at a very early period was the seat of a mint, and the coins first struck here

were called Heller (Häller). The town belonged first to the counts of Westheim, then later to the Knights Templar. In the 13th c. it became a free imperial town, and such it remained till 1802, when, with its territory of 126 sq.m. (pop. 16,000), it was added to the kingdom of Würtemberg.

HAL'LA, or HALA, a t. of Hindustan, in the country of Sinde, is situated on the left bank of the lower Indus, 35 m. n. of Hyderabad. Manufactures of caps, superior colored earthenwares, and lacquered work, are extensively carried on here. Pop. '72, 4,096, the most of whom are manufacturers. Halla is said to be the most ancient city of Sinde.

HALLAM, ARTHUR HENRY, 1811-33; son of Henry Hallam, the historian; b. London. He was educated at Eton college, and in 1833 went with his father on a tour in Europe, but died a few weeks afterwards in Vienna. He was engaged to be married to a sister of Alfred Tennyson, and his death was the motive of the remarkable poem *In Memoriam*.

HALLAM, HENRY, philosophic historian and critic, son of the dean of Bristol, was b. at Windsor in 1777, and educated at Eton and Christ church, Oxford, where he took his degree of M.A. He was first known by his writings in periodicals, especially by contributing to the *Edinburgh Review* during its early years; afterwards, he was distinguished among the literary men of Europe for his extensive and profound learning, powers of generalization, taste, judgment, conscientiousness, exhibited in a succession of great works: *View of the State of Europe during the Middle Ages* (2 vols. 4to, 1818); *The Constitutional History of England from the Accession of Henry VII. to the Death of George II.* (2 vols. 4to, 1827); and *Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries* (4 vols. 8vo, 1837–39), and a volume of supplementary notes to his *History of the Middle Ages* (1848). All these works have gone through several editions, and been translated into the languages of the leading European nations. They have procured for their author the enviable reputation of having opened up a new and great field of authorship, and labored in it with a success that as yet has not been equaled by another. Their wonderful impartiality and veracity are a rebuke to ordinary historians; and it provokes a smile to read, at this distance of time, the strictures of Southey on the acrimony, the arrogance, the injustice, and the ill-temper of their author; for England never produced a man who loved truth more disinterestedly than Hallam. Hallam, while yet a young man, was held in the highest estimation among the literary men of his time, both in London and Edinburgh. During the greater portion of his long life, however, he lived in London in privacy, devoting himself to linguistic and historical studies. In politics, he was a whig; but for the conflict of parties he was unsuited by his candor and general temperament, and took no part in them, but he displayed a genuine interest in all questions of social improvement, and acted with the Wilberforce party for the abolition of slavery, as well as in other humane schemes, and was one of the original promoters of the society for the diffusion of useful knowledge. Hallam had two sons, both of great promise, and both prematurely cut off; the elder, Arthur Henry, who died in 1833, was the friend of Alfred Tennyson the laureate, and is the subject of *In Memoriam*. Of this son, Hallam wrote a touching memoir. Hallam died Jan., 1859. He was a fellow of the royal and many other societies, and a trustee of the British museum.

HALLAMSHIRE, a district in the West Riding of Yorkshire (q.v.).

HALLE, a city of Prussian Saxony, in the district of Merseburg, known as *Halle an der Saale*, to distinguish it from other places of the same name, is situated on the right bank of the Saale, and on several small islands of the river, 20 m. w.n.w. of Leipsic. In the old town, the streets are narrow and crooked. As an important railway center, Halle has of late years rapidly increased in size, industry, and prosperity. Its famous university was founded in 1694 by Frederick I., king of Prussia; and after having been suppressed by Napoleon when it had attained the summit of its fame, was re-established in 1815, and incorporated with the university of Wittenberg, which had been dissolved during the war. At first a chief seat of the pietistic school of theology, Halle subsequently became the head-quarters of rationalism and criticism. The roll of its professors shows a long array of names distinguished in every faculty. There are attached to the university a theological and a pedagogical seminary, an agricultural institute, an observatory, surgical wards, an anatomical theater, and botanical garden; and a library containing 100,000 volumes, and various scientific collections. The endowments for the professors and lecturers (over 100 in number) are liberal. The students in attendance number ordinarily between 800 and 900. The Francke institution is one of the most important establishments of the place. See FRANCKE. The red tower on the market-place, the town-hall, and the remains of the Moritzburg, the ancient residence of the archbishops of Magdeburg, are all interesting to the antiquary. Halle is amply provided with benevolent and educational establishments for the poor, and has a well-conducted institution for the blind, deaf and dumb, and insane, with free schools for both sexes; and as the chief town of a district, is the seat of various government offices and courts of jurisdiction. Halle has manufactories of woolen and linen fabrics, gloves, buttons, hardware, and starch; but its most important industrial product is salt,

obtained from the brine-springs within and near the town, which have been worked from a very early period, and still yield between 200,000 and 300,000 cwts. annually. Those within the town are worked by a private company, while the suburban works are held by government. The men employed at the salt-springs, and known as the "Halloren," are a distinct race, supposed by some to be of Wendish, and by others of Celtic descent, who have retained numerous ancient and characteristic peculiarities. Pop. '71, 52,639; '75, 60,503.

Halle, originally a border fortress against the Slavs, became in the 10th c. an appanage of the archbishops of Magdeburg, and by the 12th c. was famous as a commercial city. In the 12th and 13th centuries Halle was a powerful member of the Hanseatic league, and waged war with neighboring potentates. Terribly impoverished during the thirty years' war, Halle was incorporated with the dominion of the elector of Brandenburg at the peace of Westphalia.

HALLÉ, CHARLES, an eminent pianist, was b. at Hagen, in Westphalia, in 1819; studied first at Darmstadt, and afterwards at Paris, where his reputation was established by his concerts of classical music. He afterwards settled in England, where his time has been principally divided between London and Manchester. In purity of style, he is considered almost without a rival, and the best living interpreter of Beethoven. His aim has ever been to raise the popular standard of musical taste, an object in which he is believed to have achieved no small success in London, Manchester, and elsewhere.

HALLÉ, or HALLEIN, a t. of Austria, in the duchy of Salzburg, and 10 m. s. of the town of that name, is situated on the right bank of the river Salza, and is noted for its extensive salt works and saline baths. Pop. '69, 3,614. It has also important cotton and needle and button factories. The Dürrenberg, a mountain 2,388 ft. above the level of the sea, from which the brine is obtained, has 34 shafts or rooms, from which the salt is conveyed in large wooden troughs to the works within the town. The annual produce amounts to about 200,000 cwts. Good rock-salt is also obtained from Dürrenberg.

HALLECK, FITZ-GREENE, an American poet, b. at Guilford, Conn., in 1790. By his mother, Mary Eliot, he was descended from John Eliot, "the apostle of the Indians." He became a clerk in a bank in New York in 1813, in which employment he remained for many years. He was afterwards for a considerable time the confidential agent of Mr. John Jacob Astor in his commercial affairs, and was appointed by him one of the original trustees of the Astor library in New York—a position which he held to the end of his life. In 1849 he retired from banking and mercantile pursuits, and took up his residence in his native place, where he spent the remainder of his days. From his boyhood, Halleck wrote verses, some of which he sent to newspapers; but in his collected poems, he has included nothing published earlier than his lines on *Twilight*, which appeared in a New York paper in 1818. In the following year, he became associated with Joseph Rodman Drake in contributing the humorous series of *The Croaker Papers* to the same journal. The illness of Drake soon put an end to these papers, and Halleck commemorated his friend's death in a very beautiful little poem. In 1819 Halleck wrote his longest poem, *Fanny*, a satire on the literature, fashions, and politics of the time, in the measure of *Don Juan*. It is said to have occupied less than three weeks in its composition, and derived its immediate and great popularity rather from the pungency of its allusions than from any higher merit. In 1822-23 Halleck visited Europe; and in 1827 published an edition of his poems, in which were included several pieces suggested by the scenes and associations of the old world, among which the lines on Alnwick castle and on Burns particularly commanded admiration. Halleck's style is spirited, flowing, and graceful; his versification almost always very smooth and harmonious. His poems display much geniality and tender feeling. Their humor is delicate and refined. Few poets, and particularly few American poets, who have written well and acquired popularity like Halleck, have written so little. His whole poems are included in a 12mo. volume of very moderate size. Halleck died Nov., 1867.

HALLECK, HENRY WAGER, an American gen., b. in 1816, at Westernville, in the state of New York. He entered West Point military academy in 1835, graduated in 1839, and for about a year acted as assistant professor of engineering. During the Mexican war he served on the lower coast of California, and, for his gallant services, was brevetted captain in 1847. From 1847 to 1849 he was secretary of state for California, under the military government of Kearney, Mason, and Riley; and in 1849 was a member of the convention to form and draft the state constitution of that province. He became capt. of engineers in 1853, left the service in 1854, and for some time practiced law in San Francisco. On the outbreak of the civil war he joined the northern army in 1861 as maj.gen., and in Nov. of the same year was appointed commander of the department of the west. In 1862 he became general-in-chief, resigning in 1864, and becoming chief of the staff. As a general, he was able and successful. He died in Jan., 1872. He wrote *Elements of Military Art and Science* (1846), *Mining Laws of Spain and Mexico*, etc.

HALLEL, signifying *praise*, is a name given to a part of the Jewish hymnal service which was chanted both in the temple and the family. It consists of Ps. cxiii—cxviii. It

is called the *Egyptian hallel* because the paschal lambs were slain while it was chanted. Another hallel is called the *great hallel* and designates the response repeated after every verse in Ps. cxxxvi. The *Egyptian hallel* was chanted for 20 days in the year in the temple at the celebration of the passover and other festivals. It was chanted also in private families on the first evening of the passover. The singing of the hymn by Christ and the disciples at the close of the passover supper is supposed to be the second part of this hallel, comprising Ps. cxv. and cxvi., which was chanted while drinking the fourth and last cup. The great hallel was chanted on special joyful occasions. The Egyptian hallel is now recited by the Jews at all the feasts but new year, the day of atonement, the last six days of the passover, and the new moon. It is uncertain when this service was instituted, different Jewish writers ascribing it to Moses, Joshua, David, Deborah, Hezekiah and others. Maimonides and Buxtorf have written extended but not entirely satisfactory works on the subject.

HALLELU'IAH (Heb. *Praise ye the Lord*), one of the forms of doxology used in the ancient church, derived from the Old Testament, and retained, even in the Greek and Latin liturgies, in the original Hebrew. The singing of the doxology in this form dates from the very earliest times; but considerable diversity has prevailed in different churches and at different periods as to the time of using it. In general it may be said that, being in its own nature a canticle of gladness and triumph, it was not used in the penitential seasons, nor in services set apart for occasions of sorrow or humiliation. In the time of St. Augustine, the African church used the halleluiah only from the feast of Easter to that of Pentecost. In other churches, it was found in most of the services throughout the year, with the exception of the seasons of Lent and Advent and the vigils of the principal festivals. In the Roman Catholic church, the halleluiah is introduced both into the mass and into the several hours of the public office, but it is discontinued from Septuagesima Sunday until Easter; and on the contrary, during the interval between Easter and Pentecost, it is introduced more frequently into the services and in circumstances of greater solemnity. It is always omitted in the services for the dead, and on the ember days, at the quarter tense, and on the principal vigils. In the church of England, the first prayer-book of Edward VI. retained the halleluiah in the original Hebrew. In the present prayer-book, although retained, it is found not in the Hebrew, but in its English equivalent, *Praise ye the Lord.* See Binterim's *Denkwürdigkeiten der Christ-Kathol. Kirche.*

HALLER, ALBRECHT VON, an eminent physiologist, was b. at Bern, Oct., 1708, and died in that city, Dec. 17, 1777. In early life he was feeble and delicate, being affected with rickets, a disease which is not unfrequently accompanied with considerable intellectual precocity. His father, Nicholas Emmanuel von Haller, who was an advocate, and had the reputation of being an able lawyer, intended him for the church; but his own inclinations being in favor of medicine, he proceeded in 1723 (two years after his father's death) to the university of Tübingen, where he became the pupil of the well-known anatomist Duvernoy. In 1725 he removed to Leyden, where he attended with much advantage the lectures of Boerhaave and of Albinus, and obtained the degree of doctor of medicine in 1727. He then visited London, where he made the acquaintance of Sloane, Douglas, and Cheselden, whence he proceeded to Oxford, and afterwards to Paris, where for six months he studied anatomy and botany under Winslow and De Jussieu; but one of his neighbors, who was annoyed by his dissections, having threatened to denounce him to the police, he made a rapid retreat to Basel, where he became the pupil of John Bernoulli, the celebrated mathematician. After seven years' study in these different seats of learning, he returned, in his 22d year, to his native city and commenced practice as a physician. The professor of anatomy, Meig, having fallen ill, Haller undertook the duties of his class; he likewise devoted much of his time about this period to the botany of the Alps; and also published a celebrated descriptive poem, entitled *Die Alpen* (The Alps). In 1735 he was appointed physician to the hospital, and shortly afterwards, principal librarian and curator of the cabinet of medals; but these offices he did not hold long, for in 1736, George II., wishing to establish a university at Göttingen, offered him the professorship of medicine, anatomy, botany, and surgery, which after some hesitation, he accepted. From this time he gave up the practice of his profession, and for the next 18 years devoted himself wholly to teaching and to original research. He took an active part in the formation of the royal academy of sciences of Göttingen; and the memoirs of the society, which appeared under the title of *Commentarii Societatis Regiæ Scientiarum Gottingensis*, contain many of his papers. During the period that he held the professorship—viz., from 1736 to 1753—he composed and published 86 works on medical subjects, chiefly on physiology and botany; and it is recorded that he contributed upwards of 12,000 notices or reviews of books to the *Göttingische gelehrte Anzeigen*, a monthly periodical work, of which he was editor. In 1753, in consequence of disputes with his colleagues, and probably in part from the delicate state of his health, he resigned his chair, and returned to his native town, where he subsequently held several important and honorable offices. He still, however, retained his position as president of the royal academy of sciences, and other more substantial distinctions, such as a retiring allowance, etc. It was after his retirement from Göttingen that some of his most important writings were published

amongst which must be especially mentioned his *Elementa Physiologiæ Corporis Humani* (Lausanne, 8 vols. 4to, 1757–66)—by far the most important of his works—and his four *Bibliothecæ*, or critical catalogues of works on botany, surgery, anatomy, and medicine. The increasing maladies of his later days did not distract his mind from the study of his favorite subjects. He recorded all the symptoms of his last illness—a combination of gout and disease of the bladder—and the gradual cessation of his vital functions; and his last words, addressed to his physician, were: "My friend, the pulse has ceased to beat."

Haller's eminence as a man of science was duly recognized even in his own lifetime. In 1739 he was appointed physician to the king of Great Britain; he was ennobled by the emperor of Germany in 1748; the universities of Berlin, Oxford, and Utrecht in vain endeavored to obtain him as their professor; and he was an honorary member of all the scientific societies of Europe. His name is especially connected with the doctrine of muscular irritability, which is noticed in the article MUSCLE AND MUSCULAR TISSUE; and if he made but few positive additions to our knowledge, his teaching and writings impressed a new aspect on physiology—a science of which he has deservedly been termed "The Father." But, while his name is indelibly recorded in the annals of science, it should also be remembered that by his work as poet, Haller greatly contributed to the movement which towards the end of the 18th c. brought new life to German poetry.

HALLEY, EDMUND, a celebrated astronomer and mathematician, son of a London soap-boiler, b. at Haggerston, near London, in 1656, educated at St Paul's school, and afterwards at Queen's college, Oxford, which he entered in 1673. He early became an experimenter in physics—before leaving school, he had made observations on the variation of the needle. In 1676 he published a paper (*Philosophical Transactions*) on the orbits of the principal planets; also observations on a spot on the sun, from which he inferred its rotation round its axis. In Nov. of the same year he went to St Helena, where for two years he applied himself to the formation of a catalogue of the stars in the southern hemisphere, which he published in 1679 (*Catalogus Stellarum Australium*). On his return he was chosen a fellow of the royal society, and deputed by that body to go to Dantzic to settle a controversy between Hooke and Helvetius respecting the proper glasses for astronomical observations. In 1680 he made the tour of Europe, during which he made observations with Cassini at Paris on the great comet which goes by his name, and the return of which he predicted. His observations on this comet formed part of the foundation of Newton's calculation of a comet's orbit. Halley returned to England in 1681, and in 1683 published (*Phil. Trans.*) his theory of the variation of the magnet. The next year he made the acquaintance of Newton—the occasion being his desire for a test of a conjecture which he had made that the centripetal force in the solar system was one varying inversely as the square of the distance. He found that Newton had anticipated him, both in conjecturing and in demonstrating this fact. For an account of Halley's connection with the publication of the *Principia*, see NEWTON. In 1686 Halley published an account of the trade-winds and monsoons on seas near and between the tropics, which he followed by some other chemico-meteorological papers. In 1692 he published his hypothesis relative to the change in the variations of the needle, to test the truth of which, by obtaining measures of the variations in different parts of the world, he was sent in 1698 in command of a ship to the western ocean; but his crew mutinied, and he was obliged to return. The next year, however, he sailed again on the same expedition, and the result of his observations was given to the world in a general chart, for which he was rewarded by the rank of captain in the navy with half-pay for life. Soon after he made a chart of the tides in the channel, and surveyed the coast of Dalmatia for the emperor of Austria. On the death of Dr. Wallis in 1703 he was appointed Savillian professor of geometry at Oxford. In 1705 he published his researches on the orbits of the comets. In 1713, on the death of Sir Hans Sloane, he became secretary of the royal society; in 1716 he made valuable experiments with the diving-bell, which were afterwards published; and in 1720, after the death of Flamsteed, he became astronomer-royal, and continued without assistance to conduct the operations at the observatory with unremitting energy. In this office, and engaged especially in studying the moon's motions, he passed the rest of his life. In 1729 he was chosen a foreign member of the academy of sciences, Paris. He died at Greenwich, Jan. 14, 1742, 86 years old. Halley had married, in 1686, a daughter of Mr. Tooke, auditor of exchequer, by whom he had several children. Besides the writings mentioned, Halley wrote many others. His *Tabulæ Astronomicæ* did not appear till 1749. Among his principal discoveries may be mentioned that of the long inequality of Jupiter and Saturn, and that of the slow acceleration of the moon's mean motion. He has the honor of having been the first who predicted the return of a comet, and also of having recommended the observation of the transits of Venus with a view to determining the sun's parallax—a method of ascertaining the parallax first suggested by James Gregory.

HALLEY'S COMET. See COMET.

HALL, HALLE, AND **HALLEIN,** are the names of various places in southern and middle Germany, possessing *salt-works*. *Hall* is also a general name for a salt manufacture. The Welsh and Armorican word for salt is *hal, halen;* hence it is inferred that these

names were bestowed by Celtic tribes of the Cymric division (to which the ancient Gauls belonged). The Gaelic for salt is *sal-ann*, agreeing thus with the Latin *sal*, and the German *salz*. The Greek *hals* (ἅλς) agrees with the Cymric. The names Salza, Salzburg, are clearly of Teutonic origin.

HALLIWELL, JAMES ORCHARD, b. England, 1820; especially noted as an archæologist and writer on Shakespeare. He has published, among other works, *Life of Shakespeare, Descriptive Calendar of the Records of Stratford-on-Avon, An Account of the New Place* (Shakespeare's residence) *at Stratford-on-Avon*, an immense edition of *Shakespeare's Works* in 16 quarto vols.; *Illustrations of the Life of Shakespeare in a Discursive Series of Essays, Dictionary of Archaic and Provincial Words, Popular Rhymes and Nursery Tales*, etc.

HALLOCK, WILLIAM ALLEN, D.D., 1794–1880, son of rev. Moses; b. Plainfield, Mass., graduated at Williams college and Andover theological seminary, ordained 1826. He founded the American tract society at New York, 1825, was for 45 years its secretary and general agent, and in its service for more than 50 years. His mind was clear and vigorous; and his rare industry and efficiency appear in the fact that nearly 4,000 publications, including 881 volumes, were examined and prepared by him line by line for the press. About the same number passed under his eye for approval for translation, and with the aid of the society's funds, were printed at mission stations in 145 different languages and dialects. He was the author of tracts and books, of which in all 1,400,000 copies were circulated in his life time.

HAL'LOWELL, a city in Maine, U. S., on the river Kennebec, 2 m. s. of Augusta. It has a town-hall, 6 churches, 3 banks, 1 newspaper office, a cotton-factory, etc. It is best known abroad from the fine quality of granite in the neighborhood. Steam-boats and vessels of 9 feet draught can load. Pop. '70, 3,007.

HALLOW-EVEN, or HALLOWEEN, the name popularly given to the eve or vigil of All Hallows, or festival of All Saints, which being the 1st of Nov., Halloween is the evening of the 31st of Oct. In England it was long customary to crack nuts, duck for apples in a tub of water, and perform other harmless fireside revelries. While the same thing can be said of Scotland, the Halloween ceremonies of that country partook more of a superstitious character; taking, among rustics, the form of a charm to discover who should be his or her partner for life. Of these now almost exploded customs, the best summary is that contained in Burns's well-known poem *Hallowe'en*. We refer to Brand's *Popular Antiquities* for some notice of old Hallow-even practices.

HALLUCINA'TIONS are morbid conditions of mind in which perception takes place where no impression has been made upon the external organs of the special senses, and where the object is believed to be real and existing. A picture is presented to the imagination when no ray of light has fallen upon the eye; a voice is heard when all around is silent; a pleasant smell fills the nostril when neither flowers nor feast give forth their fragrance. Delusions, on the other hand, originate at the other extremity of the chain of consciousness in the mind itself, and consist in erroneous interpretations of real sensations. A form passes across the vision, and it is regarded as a phantom, or a demon, or what is not and cannot be; a voice may address the listener in accents of tenderness and friendship, which before they reach the mind have assumed the shape of insults and calumnies; and the fresh odor of a rose may suggest notions of poison and pollution. But hallucinations may involve internal experiences as well as the reports from the outer world; nor is it invariably possible or necessary to distinguish hallucinations from delusions. There is a composite state in which the external impression is imaginary, and the interpretation from such an impression, had it been real, is erroneous. A clock is heard by a patient to strike where not a sound is audible by others, and the chime is held to be the announcement of the crack of doom. In all these cases, the sensorium itself must be held to be at fault, whether the nerves of seeing, hearing, etc., be structurally affected or not. These phenomena are observed in connection with all the senses, but in different proportions; the frequency being perhaps in relation to the number of healthy sensations of which the organ is the natural channel, and to the degree of excitement and cultivation to which it is ordinarily subjected. According to one authority, hallucinations of hearing constitute two-thirds of the whole observed; but, upon a more careful analysis, the following tabular expression of frequency appears to be correct: hallucinations of hearing, 49; of vision, 48; of taste, 8; of touch, 3; of smell, 1. These conditions are detectable in all mental diseases; but the proportion varies according to the form and the intensity of the alienation. All are more frequent in mania than in monomania and fatuity; and errors of vision are more numerous than those of hearing in mania. Lord Brougham at one time held that the presence of hallucinations should be elected into a crucial test of the existence of insanity. Practical men, however, demonstrate that derangement is not necessarily conjoined with such a symptom. Esquirol held that of 100 lunatics, four-fifths would be affected with hallucinations. Of 145 individuals in Bicêtre, Baudry found that 56 presented hallucinations; and the subsequent researches of Thore and Aubanel in the same hospital showed 122 affected out of 443 maniacs, monomaniacs, dements, etc. Brière de

Boismont, *Des Hallucinations* (Paris, 1845); Aubanel and Thore, *Recherches Statistiques faites à l'Hospice de Bicêtre;* Michéa *Du Délire des Sensations* (Paris, 1848).

Hallucinations of Sane Men.—In a great majority of cases, hallucinations can readily be traced to mental alienation, which is cognizable by other signs, or to conditions of the nervous system, which impair or pervert without overthrowing the mind; or to general constitutional states, or positive diseases, such as in the case of Nicolai, which involve disturbance of the functions of the external senses. There is, however, a class of phenomena which cannot be included under any of these categories; where objects appear; voices tempt, threaten, soothe, or where a series of impressions are received by the mind, without any corresponding sensation; where the system is perfectly healthy, and where the individual affected is conscious that what he sees or hears is unreal. Medical experience, however, goes to show that under such circumstances the nerve, or some organ connected with the development of special sensation, or the brain itself, is in an abnormal or excited condition, which falls short of disease, not interfering with the regular discharge of the ordinary functions of these parts of the economy, and not being detectable in any other way, and which is sometimes compatible with great intelligence, and even genius. As illustrative of the latter proposition, and of the least morbid aspect of such phantasmata, it may be mentioned that the late earl Grey was haunted by a gory head, which he could exercise at will. Swedenborg, while at the head of the government, saw members of the heavenly hierarchy seated among the ministers at the council board, and bowed reverentially to them. Bernadotte encountered a woman in a red cloak in his rides; and a patient has been described who was followed first by a cat, then by a tatterdemalion beggar, and then by a skeleton which never left him, walked side by side, joined his family circle, and peered through his curtains at night. Yet Swedenborg knew that it was not flesh and blood realities he acknowledged; the king shrunk from, but repudiated the red cloak; and the patient disbelieved the skeleton, and detected its true nature and origin.

HALLUIN, a t. of France, in the dep. of Nord, 10 m. n.n.e. of Lille. Weaving, bleaching, cotton-spinning, and brick-making are carried on, and there are manufactures of linen and calico. Pop. '76, 8,584.

HALMSTAD, a t. in Sweden, on the e. shore of the Cattegat, about 76 m. s.s.e. of Gothenburg, at the mouth of the river Nissa; pop. '75, 7,136. The castle is the residence of the governor of the province. Mention of the church of Halmstad occurs as early as 1462, and the fortifications are mentioned first in 1225. The latter were demolished in 1736. The Dominican and Franciscan monasteries, formerly in the town, are now quite destroyed. The harbor built in 1837–40, at a cost of about £5,250, admits ships of 10 ft. draught, by means of which some trade in deals, pitch, and tar is carried on. The salmon fishery is important. An archæological society holds its meetings in Halmstad, and the popular magazine, *Svenska Family Journalen*, is published there. There are both mineral and sea-water baths in the neighborhood. The oldest town-privileges of Halmstad date from 1307, while the first recorded event in its military history is the battle of Nissa, between Harold Hardrada and Sven Ulfsson. During the revolt of the miner Engelbrekt, it twice fell into the hands of the rebels—in 1434 and 1436. The town appears to have been frequently chosen as the meeting-place of the rulers and delegates of the three northern kingdoms; and under the union of Calmar it was appointed to be the place for the election of a new Scandinavian monarch whenever necessary. The län of Halland formed part of the territory of Denmark in Sweden, and, accordingly, in 1534, during his war with the Danes, Gustavus Vasa assaulted and took its chief town. In 1660, by the treaty of Copenhagen, the whole district was ceded to Sweden. In 1676 Charles XII. defeated near Halmstad a Danish army which was attempting to retake the district, and since that time Halland has formed part of Sweden.

HALMALILLE, *Berrya amonilla*, a tree of the natural order *tiliaceæ*, closely allied to the lime or linden tree of Europe, and much resembling it, but larger; a native of Ceylon, much valued for its timber, which is a favorite house-building wood in that island, and is employed for carts, casks, and all household purposes, and also for boat-building, as it is believed to resist the attacks of marine worms, and in virtue of a certain unctuosity, to preserve the ironwork from rust. It is exported to Madras—where, from the principal port of exportation, it is known as *Trincomali wood*—and the Masula boats, which brave the formidable surf there, are made of it. It is a light wood.

HAL'OGENS. This term, which is equlvalent to "salt-producers," is derived from the Greek word *hals*, salt, and includes a very distinct and well-characterized group of non-metallic elements—viz., chlorine, bromine, iodine, and fluorine, which form with metals compounds analogous to sea-salt.

The following are the most important characteristics:

1. They combine directly and at an ordinary temperature with the metals, for which they exhibit a very strong affinity; and their combinations with the metals present those properties which pertain to salts (q.v.). No elements excepting these four possess the property of entering into direct combination with metals, and of thus forming salt-like compounds. When united with the same metal, the salts which the different halogens

form are isomorphous; thus, for example, the chloride, iodide, bromide, and fluoride of potassium all crystallize in cubes.

2. They all have a very energetic affinity for hydrogen, with which they all unite in one definite proportion—viz., 2 volumes of the gas or vapor of the halogen with 2 volumes of hydrogen, the union occurring without change of bulk, that is to say, being represented by 4 volumes, and the resulting gaseous compound being intensely acid, and very soluble in water. The acids thus formed are hydrochloric, hydrobromic, hydriodic, and hydrofluoric acids. Moreover, all these halogens (except fluorine) form powerful acids with five atoms of oxygen—viz., chloric, bromic, and iodic acids; and their salts present numerous points of resemblance.

HA'LOID SALTS. These are the compounds formed by the union of one of the halogens (q.v.) with a metal. We may mention chloride of sodium (NaCl), bromide of silver (AgBr), fluoride of calcium (CaF), and iodide of potassium (KI), as examples.

HALPINE, CHARLES G., 1829–1868; b. Ireland; graduated at Dublin university; began life as a journalist. In 1847 he came to New York, and was employed on various city papers there and in other cities. He enlisted in the union army early in the war of the rebellion, and rose to be brig.gen. of volunteers. He was also a maj. in the regular army. While in the service, his papers over the signature of "Private Miles O'Reilly" were immensely popular. After the war he was elected register of the county of New York. He published many short poems, and was proprietor and editor of the *Citizen* newspaper, published in New York. He was a brilliant and vivacious writer, and socially a general favorite.

HALORAGIA'CEÆ, or HALORA'GEÆ, a natural order of exogenous plants, closely allied to *onagraceæ* (q.v.).—There are about 70 known species, herbaccous or half-shrubby; pretty much scattered over the world, but almost all aquatic, or growing in wet places. The stems and leaves often have large air-cavities. The flowers are generally small, and the plants insignificant in appearance. Nor have any of them any important uses, except those of the genus *trapa* (q.v.). The only British species are the mare's tail (*hippuris vulgaris*) and the watermilfoils (*myriophyllum*).

HA'LOS, PARHE'LIA, CORO'NÆ, etc. It would not be easy even to enumerate the various distinct phenomena which belong to the above classes; we must, therefore, be content to consider a few only of the principal varieties; and, in fact, if the causes of these be thoroughly understood, those of the others present no further difficulties, except such as are of a purely mathematical nature.

The first class we have to consider is very common. When the sun or moon is partially obscured by a mist or cloud, the latter *not* being of the species called cirrus (see CLOUD), it is almost invariably surrounded by colored rings of a few degrees only in diameter, called *coronæ* (crowns). Those surrounding the sun cannot always be seen directly; but by reflection at the surface of still water, or of a glass-plate blackened at the back, the glare of the sun-light is sufficiently diminished to permit the corona to be seen. This meteor depends on the diffraction (q.v.) of light, caused by the small spheres or vesicles of water which compose the cloud, and can easily be imitated by looking at a bright object through a piece of glass which has been breathed upon, or dusted with lycopodium seed. If the diffracting particles be all of the same size, the rings are very well marked; but since they become smaller as the particles increase in size, ordinary fogs and clouds, which generally contain particles of very different dimensions, give a composite effect, which spoils the distinctness, and greatly limits the number of the rings. Thus, no general rule can be given for the number or colors of the coronæ, but it may be observed that their diminution in diameter is a sign of the increase in size of the watery spheres which cause them, and therefore in general betokens approaching rain, which comes when the particles are no longer able, on account of their size, to float in the air without sensibly falling. As before mentioned, this appearance is very common, and, in fact, we scarcely see a fragment of a cloud near the sun which does not give traces of color, depending on the average size of the particles of which it consists, and its angular distance from the sun.

A different form of corona is sometimes seen to surround the shadow of the spectator's head, when cast by the sun on a bank of fog—in this case it is sometimes called a *glory*. To this class belong the colors generally seen about the famous "Specter of the Brocken." See BROCKEN. The same appearances are very frequently seen round the shadow of the spectator when thrown on muddy water, or water carrying numerous small particles of sand. The optical explanation, founded mainly upon reflection and interference, is complete, but not suited to our pages.

So far the phenomena depend merely on the cloud or fog consisting of small particles; nothing has yet been said about the *shape* of the particles. Spherical *drops* of water produce rainbows (q.v.), and upon the vesicular form that moisture often assumes in the air, probably depend the blue of the sky and the gorgeous tints of sunrise and sunset. But halos (Gr.) and parhelia (Gr. false or mock suns) depend upon the presence in the air of innumerable *crystals* of ice, generally forming a light cirrus cloud. We cannot enter upon a complete explanation of these phenomena, but we shall give a general idea of their origin, referring the student who wishes a thorough knowledge of the subject to a memoir by Bravais (*Journal de l'Ecole Polytechnique*, xviii.), who

has himself repeatedly witnessed and carefully measured the various appearances in question.

The theory of halos was first roughly attempted by Huyghens; but although his explanations are in the main correct (at all events, as regards the very simplest of the appearances), they are based on the utterly inadmissible supposition, that the halo-producing clouds are formed of cylinders of water, each having an opaque, frozen nucleus. It will be seen that the results of this supposition agree with those of the correct one in a few cases only. Further progress was impossible until the crystalline form and the refractive index of ice were observed. Both of these observations are of great difficulty; but they have been carried out by Wollaston and others with considerable accuracy. After Huyghens, Mariotte, admitting the crystalline form of ice-particles, made some great steps in advance, and much of what he left unexplained was successfully supplied by Young, and after him by Kaemtz. The most complete and systematic explanation of the whole subject, however, is that of Bravais, already referred to. There, references are given to nearly all the accurately recorded observations of halos and parhelia—the great mass of which, of course, are due to arctic voyagers, especially Scoresby and Parry.

Water crystallizes in the form of regular hexagonal prisms, sometimes with plane ends perpendicular to the sides, sometimes with hexagonal pyramids as terminals. There is also an immense variety of much more complex forms; but upon the simpler and more common ones already mentioned, depend the ordinary cases of the phenomena we are about to describe. Now, if we consider any two non-parallel faces of one of the above crystals, it is clear that their combination must act as a prism, decomposing white light, which passes through them, into its constituent colors. Every such crystal, then, placed somewhere near the line joining the eye and sun, must in general send to the former some definitely colored ray from each effective pair of surfaces. The refractive index, however, of ice is such that no ray can pass through a prism of it whose angle is greater than about 99°.5; and we are therefore limited to pairs of faces whose inclination is not superior to this. The most important pairs are two *alternate* faces of the prism (fig. 1), where the inclination is 60°, and a face with a terminal plane, the angle being 90°.

Halo of 22° Radius.—We may now suppose prisms of ice, with refracting angles of 60°, to be distributed (with every possible position of their axes) nearly between the sun and the spectator, and it is evident that the appearances produced must be symmetrical with regard to the line joining the eye and sun, and must therefore consist of colored circles with the sun as center. To attain a more exact idea of the nature of these circles, suppose that we are dealing with light of one color only (say red). Now (see PRISM), if a beam of homogeneous light falls on a prism, it is refracted without separation. If the prism be turned gradually and uniformly about its axis, the refracted ray also turns, but *not* uniformly—at first rapidly, then slower, till it reaches a point at which it appears to be stationary for a little; then, on further turning the prism, the refracted ray *retrogrades*, at first slowly, then faster. There is therefore, a position of the prism, called that of *minimum deviation*, for which a slight alteration of the prism produces none in the direction of the refracted ray. Hence, as we have supposed prisms to be in the cloud in every possible position, those which are near the position of minimum deviation will conspire to refract light in the *same* direction, and their effects will be added. All the others will cause a *greater* deviation of the light, but few will conspire to send the light in any given direction. The appearance will therefore be a bright circle of red light surrounding the sun as center, its angular radius being the angle of minimum deviation, which, for a prism of ice of 60° angle, is about 21° 50′. Inside this circle there will be *no* light; outside, a feeble illumination only, becoming fainter as we go further from the sun. With orange light alone, there would be a somewhat larger circle, and so on. Hence, when white light falls on such a system, the effect is a circular halo, dark within, red on its inner edge, and with a mixture of more or less of the colors of the spectrum from inside outwards; so that, like the rainbow, which it much resembles, it differs from the ordinary spectrum (q.v.).

If we consider next the light *reflected* from the surfaces of the prisms, this will be *white*, and diffused with approximate uniformity all about the sun.

But the prisms with plane ends are not likely to be suspended in the air in all positions alike. If the prism be long and fine, it will have a tendency to fall end foremost, i.e., with its axis vertical, or (it may be) horizontal. If it be a flat hexagonal cake (a frequent form of snow), it will tend in the main to fall edgeways, so that, in addition to the halo which depends upon the ice-crystals having every possible position, there are distinct phenomena depending on an excess of the crystals having their axes vertical or horizontal. If we consider the sun as just rising or setting, it is plain that the right and left hand portions of the halo will be much more strongly marked than the others, as these parts are formed by crystals whose axes are vertical, and which form the majority. There are therefore to right and left of the sun, and on the halo, bright-colored images of the sun, which are called *parhelia*, or mock-suns.

It is perhaps a little more difficult to explain to the non-mathematical reader the formation of parhelia when the sun is not on the horizon, and to show why they then separate from the halo, and are formed externally to it, still, however, at the same

altitude as the sun. We may, however, make the attempt as follows: Suppose an indefinitely long vertical prism; rays of sunlight falling on this are separated, as before, but if the sun be not on the horizon, they no longer fall on the prism perpendicularly to its edge. Optics, however, shows us that for this oblique incidence also there is a position of minimum deviation, and therefore one angular distance from the sun at which the effects of a great number of prisms conspire, while far fewer conspire at any other angle. It is also shown that this minimum angle is greater as the incidence is more oblique. Also the inclination of the incident and refracted rays to the edge of a prism is always the same, however the ray may fall. Hence, as the edges of the prisms in question are vertical, the refracted rays appear to come from a point at the same altitude as the sun, and, by what was remarked above, further from the sun as the sun is higher. Hence the formation of the parhelia consisting of two colored images of the sun, at the same altitude as that body, and further beyond the halo as the sun is higher. Accurate measurements of their distance from the sun for different altitudes have been found to accord exactly with the results of calculation from the optical data. See PP (Ill.).

The light *reflected* from the surfaces of the vertical prisms, of course appears to come from an image of the sun in a vertical mirror, which, by optical laws, must have the same altitude as the sun itself. Such images then form a *white* horizontal small circle, passing through the sun and the parhelia. This is often observed, and helps to corroborate the above theory of the colored appearances. See the dotted line PSP (Ill.).

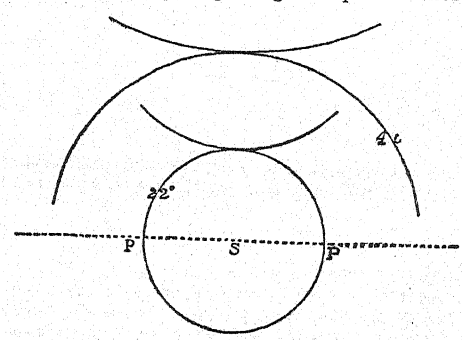
The light reflected from the horizontal terminals of these prisms must evidently produce a single white image of the sun, as much below the horizon as he is above it, and *vice versâ*. This appearance is also common enough.

Tangent Arcs to the Halo of 22°.—We have seen that in many cases the prisms of ice are so short as to be hexagonal plates. Their natural position in falling will be edge foremost, or there will be a multitude of snow-crystals whose axes are nearly horizontal, but of course arranged in all directions in the horizontal plane. Let us consider first all those whose axes are perpendicular to the line joining the spectator with the sun; these evidently (by an explanation similar to that of the parhelia given above) form parhelia *on* the halo at its upper and lower points. Another set, whose axes are also nearly horizontal and parallel, but slightly inclined to the former, will form parhelia to one or other side of the vertical plane passing through the sun, and on account of the obliquity of the incidence, the angle of deviation is increased, and these are *outside* the halo. They are further to the right or left of the sun's vertical plane, and further outside the halo as the crystals are more and more turned in their horizontal plane. The complete result is a brightly colored pair of arcs, which *touch* the halo at its upper and lower points, and lie completely outside. For certain elevations of the sun, these combine, forming a curve like an ellipse, whose center is the sun, whose larger axis is horizontal, and which touches the halo externally at its upper and lower points.

Halo of 46°.—This depends upon the right-angled prisms, formed by combining a terminal plane with one of the faces of the hexagonal prism; and with the single exception of a different refracting angle, and its consequent greater dimensions, its explanation and its appearance are the same as those of the halo of 22°.

Perhaps the most magnificent, both for brightness and separation of colors, of all the halos, is the colored arc which touches the halo of 46° at its upper point. This depends entirely upon the refraction of light through the upper edges of prisms having plane ends and whose axes are *vertical*. It is therefore due to the same cause as the parhelia of the halo of 22°; and it is a remarkable proof of the truth of this, that there is but one instance recorded in which the former appeared without the latter; and its absence was then easily accounted for by there being no cloud of ice-crystals near enough the sun to produce the parhelia. See Ill.

There are also sometimes seen brightly colored arcs touching one on each side the lower half of the halo of 46°. They are explained by the right angles of prisms whose axes are horizontal. Again, a parhelion being itself a source of light, sometimes very intense, may have *its* surrounding halos of 22°, etc. All phenomena of the latter class are termed *secondary*. They are in general, as might be expected, much fainter than the *primary* ones, but in favorable circumstances have been distinctly observed.



In addition to our very imperfect sketch of the results of the prisms of 60° and 90°, we might consider shortly those due to various combinations of planes of the hexagonal pyramid with each other, or with planes of the prism; but the phenomena depending on these, though easily enough predicted mathematically, are not well suited for verbal explanation.

We conclude with a rough geometrical sketch of a tolerably complete set of halos, observed by Bravais in Sweden in 1839. The marks on the sketch will be sufficient to inform the reader to which of the classes above mentioned the various portions belong.

HA'LOSCOPE, the name of a beautiful optical instrument invented by M. Bravais of France, for the exhibition of all the phenomena connected with halos, parhelia, etc. It consists of a vertical axis with a clock movement, for the purpose of giving it a rapid rotation; two glass prisms, one hollow to contain water; two opaque plates of glass to obscure one or two sides of the prisms, as required in different experiments; a quadrangular prism; and a small arm carrying a mirror: this last and the three prisms are all adapted for mounting on the axis. To imitate the parhelion, the vertical axis with the solid glass prism is set in rapid rotation in a darkened chamber, with a candle ten or twelve feet distant, but with the flame on the same plane as the rotating prism; two sides of the prism are to be obscured with the movable opaque slides of glass. The spectator then looks horizontally at the revolving instrument, and sees the parhelion circle. Different dispositions of the apparatus produce the allied phenomena.

HALOX'YLIN, the name of a new kind of explosive material or blasting-powder which has been invented in Styria by two brothers, and is described as incapable of spontaneous ignition, and as quite free from smoke and noxious gases. It is composed of non-resinous sawdust, charcoal, niter, and ferrocyanide of potassium, and is twice the bulk of gunpowder, but one-half more powerful. For blasting and mining purposes it is considered as preferable to gunpowder.

HALS, FRANS, 1584–1666; a Dutch painter second only to Rembrandt. At the time when the Dutch nation fought for independence and won it, Hals appears in the ranks of its military guilds. He was also a member of the chamber of rhetoric, and chairman of the painters' corporation at Haarlem. But irregularities of life marred his success, and in 1654 the forced sale of his pictures and furniture for debt brought him into absolute penury. At one time his rent and firing were paid by the municipality, which afterwards gave him an annuity of 200 florins. Hals's pictures illustrate the various strata of society into which his misfortune led him. His banquets or meetings of officers, of sharpshooters, and guildsmen are the most interesting of his works. But they are not more characteristic than his low-life pictures of itinerant players and singers. His portraits of gentlefolk are true and noble, but hardly so expressive as those of fish-wives and tavern heroes. His first master was Van Mander, the painter and historian. Of his numerous children, the best known is FRANS HALS, the younger, 1622–69. His pictures represent cottages and poultry, and the "Vanitas" at Berlin, a table laden with gold and silver dishes, cups, glasses, and books, is one of his finest works and deserving of a passing glance. Quite in another form, and with much of the freedom of the elder Hals, DIRK HALS, his brother, is a painter of festivals and ball-rooms. But Dirk had too much of the freedom and too little of the skill in drawing which characterized his brother. He remains second on his own ground to Palamedes. A fair specimen of his art is a "Lady playing a Harpsichord to a Young Girl and her Lover" in the Van der Hoop collection at Amsterdam. More characteristic, but not better, is a large company of gentlefolk rising from dinner, in the academy at Vienna.

HALSTEAD, a market-town of England, in the co. of Essex, is agreeably situated on both banks of the Colne, about 43 m. n.e. of London, and on the high-road from that city to Norwich. Its parish church, one of the finest in the county, is in the perpendicular style, with a decorated chancel. The chief educational institution is lady Mary Ramsey's grammar school, with a small endowment, founded in 1594. The manufactures are crape, silk, velvet, and paper; brick-making and straw-plaiting are also carried on. Pop. '71, 5,783.

HALSTEAD, MURAT, b. Ohio, 1829; a journalist, long the editor of the *Cincinnati Commercial*. He was educated at Farmers' college, College Hill, Ohio, and began to write for newspapers in Cincinnati at the age of 18. In 1851 he started a Sunday journal which lived two weeks. After roughing it on various papers, he got a place on the *Commercial* and slowly gained way until he became the responsible head. He is an active politician, though claiming to be independent of all parties.

HALTON, a co. in the province of Ontario, Canada, on lake Ontario, near the w. end; 362 sq.m.: pop. '71, 23,606. It is crossed by the Great Western, and the Grand Trunk railroads. Seat of justice, Milton.

HAL'YARDS, the smaller ropes and tackle used in hoisting sails or other portions of a ship's equipment. The signal halyards are running cords of the best white hemp, passing through a pulley in the truck at the mast-head, or gaff-point, and thence to the deck; the flags when attached to them are rolled up, and then hoisted and expanded to the wind by a jerk when the proper moment arrives.

HALYBURTON, THOMAS, a Scotch divine, b. 1674, d. 1712. He was the author of several works, including *Natural Religion insufficient, and Revealed necessary to Man's Happiness; The Great Concern of Salvation;* and *Ten Sermons preached before and after the Celebration of the Lord's Supper*. The works, especially the autobiographic memoir, of the "Holy Halyburton" were once very popular among the people of Scotland; and even at the present day they are greatly relished by persons of a serious disposition.

They were published, together with an essay on his "Life and Writings," by Robert Burns, D.D. (London, 1835).

HALYS, now known as Kizil Temak or Red river, the largest stream in Asia Minor. It rises in Pontus, and flows s.w. until it reaches the Mons Argœus; thence turning in a northerly direction it traverses Galatia as far as Gangra, the frontier town of Paphlagonia. Its course is then in a n.e. direction; and separating Galatia and Pontus from Paphlagonia, it discharges itself into the Euxine sea. Its mouth is 50 m. distant from Sinope. The Halys being the largest river of Asia Minor, a common division of the country was Asia cis-Halyn and Asia trans-Halyn. This river is 500 m. in length, but is not adapted for navigation, and in summer is so shallow as to be easily crossed by wading.

HAM, properly the hind part or angle of the knee; but usually applied to the cured thigh of the ox, sheep, or hog, more especially the last. Ham-curing, or, what is the same thing, bacon-curing, is performed in a variety of methods, each country or district having its own peculiar treatment; these, however, relate to minor points. The essential operations are as follows: The meat is first well rubbed with bay-salt, and either left on a bench that the brine may drain away, or covered up in a close vessel; after a few days it is rubbed again, this time with a mixture of salt and saltpeter, to which sugar is sometimes added, or with a mixture of salt and sugar alone. It is then consigned to the bench or tub for at least a week longer, after which it is generally ready for drying. *Wet salting* requires, on the whole, about three weeks; *dry salting,* a week longer. Mutton-hams should not be kept in pickle longer than 12 or 14 days. Some hams are merely hung up to dry without being smoked; others are removed to the smoking-house, which consists of two and sometimes three stories; the fire is kindled in the lowest, and the meat is hung up in the second and third stories, to which the smoke ascends through holes in the flooring. The fire is kept up with supplies of oak or beech chips, though in some districts, as in Westphalia, twigs of juniper, and in many parts of Great Britain peat, are used. Fir, larch, and such kinds of wood, on account of the unpleasant flavor they impart, are on no account to be used. The fire must be kept, night and day, in a smoldering state for about six weeks, at the end of which time, if the ham be not more than 5 or 6 in. deep, it is perfectly cured. As cold weather is preferable for this operation, it is chiefly carried on during winter. Many of the country-people in those parts of England where wood and peat are used for fuel, smoke hams by hanging them up inside large wide chimneys, a method common in Westmoreland. The curing of beef and mutton hams is carried on chiefly in the n. of England and Dumfriesshire in Scotland; that of pork-hams, on the other hand, forms a large and important item in the industry of various countries. Westphalia, in particular, is celebrated for the delicacy and flavor of its smoked hams. The efficiency of wood-smoke in preserving meat is due to the presence of pyroligneous acid. See PYROLIGNEOUS ACID and CREOSOTE.

HAM, a small t. and fortress of France, in the department of Somme, and situated on the river of that name, is distant 36 m. e.s.e. of Amiens, and about 70 m. n.n.e. of Paris. It is of ancient orgin; coins were struck here in the reign of Charles the bald (840–877). The seigniory or lordship of Ham, erected into a duchy in 1407, was held by the families of Courcy, Orleans, Luxembourg, and Vendome. The town is chiefly noteworthy on account of its old fortress or castle built by the constable de Saint Pol in 1470, and now used as a state prison. Its walls are 39 ft. thick, and its principal tower is 108 ft. in height, and the same in diameter. It is memorable as the place of confinement of Marbœuf, Moncey, and others; and subsequently of Polignac, Chantelauze, Peyronnet, and Guernon Ranville from 1831 to 1836; and of Louis Napoleon, the late emperor, from 1840 till 1846. After the *coup d'état* of Dec. 2, 1851, the republican generals Cavaignac, Lamoricière, Changarnier, and others were kept here for some time. Pop. '76, 3,122.

HAM, according to the writer of Genesis, was one of the three sons of Noah, and the brother of Shem and Japheth. The word is derived by Gesenius from the Heb. *Hamam,* "to be hot." His descendants are represented in the biblical narrative as peopling the southern regions of the earth, Arabia, the Persian gulf, Egypt, Ethopia, Libya, etc. Both he and his son Mizraim appear to have given their name to Egypt in particular. The Coptic or native name of Egypt is *Kem* or *Chem,* supposed to be the same word as Ham, and signifying both black and hot. In the hieroglyphic language, the name of Egypt is expressed by the two letters K. M. In the Rosetta inscription, the word occurs more than ten times, and is read by Champollion, *Chmè.* It is a curious and somewhat perplexing circumstance, that Ham should have received a name that must have been more appropriate to his descendants than to himself, for we are not told, and there is no reason to believe, that he was more sun-burned or blacker than his brothers. In explanation of this, it is customarily urged that the names of Noah and his sons had "prophetic significations"—an hypothesis which few feel to be altogether satisfactory.

HAMADAN', an important t. of Persia, in the province of Irak Ajemi, is agreeably situated at the northern base of mt. Elwund, 180 m. w.s.w. of Teheran, in lat. 34° 50′ n., and long. 48° 28′ east. Its streets are narrow and dirty; but the trade and manu-

factures carried on impart to it a lively and bustling air. It contains numerous caravansaries, excellent and well-furnished bazaars, gardens, baths, and mosques, as well as two notable tombs, one that of the famous Arabian philosopher and physician, Avicenna (q.v.), which draws numerous pilgrims to the town; and the other affirmed to be that of Mordecai and Esther. During four months in winter the cold here is excessive, and fuel with difficulty procured; throughout the rest of the year, however, the climate is delightful. Being the center of converging routes from Bagdad, Erivan, Teheran, and Ispahan, it is the seat of a large transit trade. Hamadan carries on extensive manufactures of leather; coarse carpets, woolen and cotton fabrics, are also made to some extent. Pop. variously estimated at from 10,000 to 40,000. Recent explorers have concluded, from historical evidence, and from the coins, inscriptions, and other remains found here, that Hamadan occupies the site of the Median Ecbatana. See ECBATANA.

HAM'ADRYADS. See NYMPHS.

HA'MAH (Gr. *Epiphania*, and the *Hamath* of the Bible), a city of Syria, 120 m. n. of Damascus. The town is built on both sides of the Orontes, which is here crossed by four bridges. A number of huge wheels, turned by the current, raise the water into aqueducts, which convey it to the houses and mosques of the town. The town is inclosed by walls, and the houses are built in the Damascus style of sun-dried bricks and wood. The principal structures are the governor's palace, many mosques, baths, bazaars, and the wheels and aqueducts already mentioned. There are manufactures of silk, cotton, and woolen fabrics, gold and silver thread. Hamah ranks among the oldest cities in the world. It was a noted place, and the capital of a little kingdom, when the Israelites came out of Egypt; and its name is mentioned in almost every passage in which reference is made to the northern border of the promised land. Pop. 30,000.

HAMAMELI'DEÆ. See WITCH HAZEL.

HAMAN, vizier and chief minister of Ahasuerus, king of Persia. After the failure of his attempt to exterminate the Jews in the kingdom, Haman was hanged on the gibbet which he had prepared for Mordecai. Jewish tradition declares Haman to have been descended from a chief family of the Amalekites, their ancient enemies: and it is said that many modern Jews apply the name Haman to any enemy, even Christians.

HAMANN, JOHANN GEORG, a very orginal thinker and author, who, on the title-page of some of his writings, called himself the "Magician of the North," was b. at Königsberg, in Prussia, Aug. 27, 1730. His early life was somewhat checkered: and a failure to acquit himself creditably in some business with which a merchant of Riga had intrusted him, induced him to abandon himself to dissipation, from which he was rescued by reading the Bible. He now devoted himself to the study of the ancient languages and of oriental literature, and made the acquaintance of many eminent authors. He died at Münster, June 21, 1788. As an author, Hamann was little esteemed by his contemporaries, as he opposed the tendencies of the age, and defended the dignity of revelation against the attacks of the rationalists, and was thus placed in opposition to the multitude of scholars. His language, besides, was figurative and symbolical in the highest degree, and frequently concealed, rather than revealed, the depth of his thinking. But his unmistakable genius, and the rich suggestiveness of his ideas, were appreciated highly by Herder, Goethe, Jacobi, Jean Paul, and other great men. The influence which he exercised upon Herder's views was very great. All his writings exhibit a deeply spiritual faith in the unseen and the eternal. Fragments of them were published by Cramer, under the title *Sibyllinische Blätter des Magus aus Norden* (Leip. 1819), and his *Sämmtliche Werke*, by F. Roth (7 vols. Berlin, 1821–25); an 8th vol., published by G. A. Wiener, Berlin, 1843, contains additions and explanations. His biography was published by E. H. Childemeister (*Hamanns Leben und Schriften*, 6 vols., 1857–73); and by Poel (2 vols., 1874–76).

HAMASAH, more correctly HAMASEH, the name of a famous Arabian anthology compiled by Habîb ibu Aus et-Tâi, surnamed Abû Temmân, which consists of 10 books, containing 884 poems on various subjects. These poems are fragmentary, and belong to the class of extempore utterance. The compiler himself was a distinguished poet in the style of his day (832 A.D.), who wandered through the provinces of the Moslem empire. He visited Khursâsân, then ruled by Abd-allâh, son of Tâhir, who rewarded him in various ways. On his return home, he was detained at Hamadan, and was for many months the guest of Abul-Wafâ, son of Selemeh. There he compiled a portion of the Hamasah, which remained a precious heirloom in the hands of the family of his host, until the decay of their fortunes, when a man named Dînawar took it to Ispahan and left in the care of the learned men there. The Hamasah is justly celebrated for its truth to nature, and while of little value as a historical record, forms a complete portraiture of the hardy and manful natures, and the lives of passion and storm which characterized the valiant stock who bore Islam abroad in a flood of new life over the worn-out civilizations of Persia, Egypt, and Byzantium.

HAMBACH, a village in Bavaria, 15 m. w. of Spires; pop. about 2,200. On May 27, 1832, there was held here a political meeting, the Hambacher Fest, which was attended by 30,000 persons, who combined to forward a movement for "the regeneration of Germany as a free country." A year afterwards there was a conflict at the anni-

versary celebration, and thereafter the meetings were forbidden. The village contains an old castle built in the middle ages. It was greatly damaged in the revolution of 1849.

HAMBA'TO, a t. of Ecuador, in South America, stands in lat. 1° 4′ s. and long. 78° 56′ w., at the n.e. base of Chimborazo, with Cotopaxi, about 25 m. distant, in front. Its elevation above the sea is 8,860 feet. At this altitude, wheat grows even under the equator. Though twice destroyed—by an eruption of Cotopaxi in 1698, and by an earthquake in 1796—Hambato has still a flourishing trade in grain, sugar, and cochineal, and contains about 12,000 inhabitants.

HAMBLEN, a co. in e. Tenn., between the French Broad and Holston rivers, intersected by the east Tennessee, Virginia and Georgia, and the Cincinnati, Cumberland Gap and Charleston railroads; 160 sq.m.; formed after the census of 1870. It is hilly or undulating, and the soil is fertile. Co. seat, Morristown.

HAM'BURG, The Republic of, is the largest of the free cities of Germany, and is situated in lat. 53° 32′ n., and long. 9° 58′ e., on the n. bank of the Elbe, at its junction with the small streams of the Alster and the Bille, about 75 m. from the German ocean. Hamburg was founded by Charlemagne in 804, but its commercial history began in the 13th c., when the emperor Frederick I. granted it the free navigation of the Elbe from the city to the sea, with the right of levying a toll on foreign shipping. These privileges were confirmed by his son, Otho IV., who raised Hamburg to the rank of a free city. In 1241 Hamburg joined with Lübeck in the formation of the Hanseatic league (q.v.), and from that time increased rapidly in wealth and commercial importance, augmenting its territory by the purchase of the township of Ritzebüttel, at the mouth of the Elbe (where the harbor of Cuxhaven is now situated), and several villages and islands in the vicinity of the town. Under the protection of the German emperors, Hamburg soon became powerful enough to defend itself and its commerce both by sea and land, and carried on war for a considerable period against the Dutch and the Danes, though with varying success. It early embraced the doctrines of the reformation, and in consequence of the vigorous administration of its affairs, never had an enemy within its walls during the stormy period of the thirty years' war. The frequently recurring disputes with Denmark ceased in 1768, when that power renounced all claim to any portion of the Hamburg territory. The prosperity of the city continued to increase until 1799, when a great commercial crisis occurred, followed in 1806 by its occupation by the French, which, with a few interruptions, lasted till 1814. During this period the town was strongly fortified, it being Napoleon's intention to make Hamburg the stronghold of his power in northern Germany. The sufferings of the citizens were very great, and their losses were estimated at £10,500,000. Their miseries culminated in the siege which the French under Davout sustained from the Russians in the winter of 1813–14, when 30,000 people were driven out of the town, many of whom perished of cold and hunger. In 1815 Hamburg joined the German confederation, and enjoyed a return of its former prosperity until the terrible fire of 1842, by which, within three days, one-third of the city was destroyed, and great loss of life and property took place. The fire was, however, not an unmixed evil, for advantage was taken of the opportunity to reconstruct that portion of the town, which by its broad, well-lighted, and well-drained streets, and fine and lofty houses, offers a striking contrast to the remaining part, much of which is devoted to wholesale business, and intersected by canals communicating with each other and with the river, by which goods are conveyed in lighters to and from the warehouses. The old ramparts have been converted into gardens and walks, and the beauty of the city is greatly increased by two large sheets of water formed by the Alster, and surrounded by good hotels and private houses, many of which in the suburb of Uhlenhorst, about two miles from Hamburg, are very charming.

There are several fine buildings, of which the exchange—where 4,000 merchants and others meet daily—and the picture gallery are the principal. Among the churches the principal are—St. Nicholas's, built from designs by sir Gilbert Scott, at a cost of £200,000, as a memorial of the fire of 1842, a very fine Gothic building, with one of the loftiest spires in Europe (483 ft. high); St. Michael's, built in the 18th c., in the Renaissance style, and also distinguished by a lofty spire (432 ft. high); and St. Catharine's, which is interesting from its age, being one of the few churches that escaped the fire.

Hamburg is the commercial emporium of northern Europe, and has recently been connected by bridges across the northern and southern branches of the Elbe with Harburg in Hanover, by which direct railway communication has been obtained with the free city of Bremen, and the route to Paris shortened by several hours. Great facilities have been given for the loading and discharging of steamers by the recent construction of extensive quays furnished with steam-cranes, warehouses, and communication by rail with the whole of the continent. Constant efforts are made to deepen the bed of the river, and under favorable circumstances vessels drawing 18 ft. can go up to the harbor at high tide. The number of sea-going ships that entered the port in 1876 was 4,991, with a burden of 2,180,451 tons, including 2,903 steamers of 1,721,048 tons, the total crews being over 70,000. The annual imports have trebled within the last 21 years. The goods received by sea, land, and river, on an average of the five years 1869

–73, amounted to 62,624,000 cwts., with a value of £78,680,000 per annum, of which 24,270,000 cwts., valued at £28,806,000, were from the United Kingdom. The average weight of the outward cargoes in the same period was about 12,000 cwts. In 1875 the total value of imports was £85,050,000.

Hamburg is one of the largest coffee-marts, and next to London, has the largest money-exchange transactions in Europe. It is also one of the principal emigration ports of Germany, above a quarter of a million persons having left during 1870–74, chiefly for the United States. There are several large joint-stock banks; marine insurance is also carried on extensively, the value of the ships and cargoes insured in 1872 having been £100,500,000. The sea-going ships belonging to Hamburg in 1877 were 439, of 196,011 tons, including 96 steamers, with a burden of 83,826 tons, chiefly belonging to five companies, and maintaining communication with North and South America and the East Indies. The manufactures of Hamburg are of little consequence, and are not estimated to exceed £2,500,000 in value per annum. The principal are cigar-making, spirit and sugar refining, brewing, meat-curing, engineering, and ship-building.

The charitable institutions of Hamburg are numerous and well endowed. The most important are the almshouses founded recently by Schroeder and Laeisz, and the Jewish hospital founded by the late Solomon Heine. There are a great many societies and asylums for the relief or reception of various classes, and the poor in general are well cared for. The general hospital has accommodation for 1800 patients, and there is a smaller hospital in connection with the sailors' home. The Rauhe haus, at Horn, near Hamburg, founded by Dr. Wichern in 1833, is worthy of notice as a very successful attempt to reform depraved and neglected children. Education is well attended to, and there are several large and excellent private schools, and a school of art, in addition to the Johanneum, a public grammar-school founded in 1528. There are two large public libraries, an observatory, botanical and zoological gardens, the latter being large and laid out with great taste; there are also two large and several small theaters, and a greater number of public gardens and places of amusement than in any other city of the same population.

The constitution of Hamburg is democratic. The executive power is vested in a senate of eighteen members chosen for life, with the assent of the municipal council, one-half of whom must have studied law; the legislative power being confined to the municipal council, consisting of 192 members, who are elected for six years, one-half retiring every three years. There is a very good tribunal of commerce, in addition to the ordinary courts of justice. Appeals can be carried in commercial cases to the supreme court of commerce at Leipsic, and in other cases to a court of appeal for the three Hanse towns at Lübeck. In 1866 Hamburg became a member of the north German confederation, and is now one of the states of the empire, sending three members to the imperial parliament at Berlin. The township of Bergedorf, 10 m. s.e. from Hamburg, formerly held jointly with Lübeck, became the sole property of Hamburg in 1868, and the whole territory covers an area of 156 English sq m.; pop. '75, 388,618, of whom about 14,000 are Jews and 7,800 Catholics. The city proper with its suburbs had in the same year a pop. of 348,447. As in the time of the Zollverein, Hamburg is still a free port; but the outlying portions of its territory are as formerly without the free-trade limit, and are subject to the same economical arrangements as the rest of the empire. Customs on goods passing beyond the boundaries of the free port are collected mainly at the railway stations of the city. Although Hamburg retains the management of its local affairs, the independent position formerly enjoyed by the republic ceased in 1866; the most noticeable consequence of this being the abolition of the Hamburg flag, and the withdrawal of its numerous consular and diplomatic representatives in foreign countries, in addition to compulsory service for three years in the army or navy by all young men liable to military duty. The estimated revenue of Hamburg in 1876 was £1,200,000.

HA'MELN, an interesting t., and formerly a fortress of Hanover, in the province of the same name, is beautifully situated on a commanding position on the Weser, at the confluence of the Hamel with that river, 25 m. s.w. of Hanover. It is surrounded by a wall, formerly surmounted by 20 towers, and defended by a fort, which, however, was blown up by the French in 1806. It is irregularly built, and is full of wooden houses in the old German style; has three churches, including the Münster, a fine old edifice, dating from 1127, and now falling into ruin; and a large educational institution built in 1827. The chain-bridge at Hameln, crossing the Weser, was completed in 1839, and is about 780 English ft. in length. Pop. '75, 9,520, chiefly employed in brewing; in the manufacture of paper, cement, woolen goods, and carpets; and in agriculture, salmon-fishing, and general trade. In the earliest times, Hameln belonged to the abbey of Fulda, and was a member of the Hanseatic confederation.

HAMERTON, PHILIP GILBERT, b. England, 1834. At the age of sixteen he made his appearance as an author, in *Rome in* 1849, and in the following year published a volume on heraldry. He had already devoted himself with considerable earnestness to the study of landscape-painting, and his passion for the art induced him to spend two years in Paris, which were devoted in this direction, and to explorations in French literature. In 1858 he commenced the periodical encampments on an island in loch Awe,

which continued during several years, and which he afterwards described in *A Painter's Camp in the Highlands*, and *Thoughts about Art*. In 1861 Mr. Hamerton went to reside in France, where he produced some important pictures, becoming also a contributor to the *Fine Arts Quarterly Review*, and to the *Fortnightly*. He also wrote art criticisms for the *Saturday Review*, and published several critical works on French art. In 1869 he founded the *Portfolio*, which soon achieved a high position in the esteem of cultivated persons, and became an authority in art matters, dignified by care in writing, and remarkable excellence in illustration. He has also written *The Unknown River; An Etcher's Voyage of Discovery; Chapter on Animals; The Sylvan Year;* the *Life of Turner; The Intellectual Life;* and *Round my House.*

HAMI, or KOMUL, a t. in central Asia, on the s. slope of the Thian-Shan mountains and the n. verge of the Gobi desert, 42° 48′ n., and 93° 28′ e., 3,150 ft. above tide. The town is first mentioned in Chinese history in the 1st c., under the name I-wu-lu, and said to be situated 1000 lis (a *li* is one third of a mile) n. of the fortress Yu-men-kaun, and to be the key to the western countries. This evidently referred to its advantageous position, lying as it did in a fertile tract, at the point of convergence of two main routes running n. and s. of the Thian-Shan, and connecting China with the west. It was taken by the Chinese in 73 A.D. from the Hiungnu (the ancient inhabitants of Mongolia), and made a military station. It next fell into the hands of the Uigurs, or eastern Turks, who made it one of their chief towns and held it for several centuries, and whose descendants are said to live there now. From the 7th to the 11th c., I-wu-lu is said to have borne the name of Igu, or I-chu, under the former of which names it is spoken of by the Chinese pilgrim Hwen-Thsang, who passed through it in the 7th century. The name Hami is first met with in the Chinese *Yuan-shi*, or *History of the Mongol Dynasty*, but the name more generally used there is Homi-li or Kom-li. Marco Polo, describing it apparently from hearsay, calls it Camul, and speaks of it as a fruitful place, inhabited by a Buddhist people of idolatrous and wanton habits. Owing to its commanding position on the principal route to the west, and its exceptional fertility, it has very frequently changed hands in the wars between China and her western neighbors. As regards the latter quality, it is even now said to yield rice, melons, oranges, and grapes of notable excellence, while, with respect to the former, baron F. Von Richthofen states that the route from Hsi-ngan-fu past Hami to Kuldja, is by far the best and indeed the only natural line for a railway from China to Hami. The Russian officer Sosnofski entered it in the autumn of 1875, after eight days' journey across the Gobi steppe lying to the south. He speaks of it as an important mart, whither wool from Turfan and Turkistan goods are brought to be exchanged for the products of central China. The Mohammedan population consists of immigrants from Jitishahr (or Kashgaria) Bokhara, and Samarcand, and descendants of the Uigurs. [*Encyc. Brit.*, 9th edition.]

HAMIL'CAR was a name borne by several distinguished Carthaginians, the most celebrated of whom were—1. The commander of the great Sicilian expedition, 480 B.C.; 2. One of the commanders of a Carthaginian army, defeated by Timoleon, the Corinthian general, at the Crimissus, 339 B.C.; 3. (surnamed Rhodanus) The ambassador to Alexander the great after the fall of Tyre; 4. The governor of Sicily, 317 B.C.; 5. The son of Gisco, who succeeded the preceding, and carried on military operations against the Syracusans and other states with great success, but was at length taken prisoner, and put to death; 6. A commander during the first Punic war, who was very successful against the Romans by land in Sicily, but was afterwards defeated in a sea-fight off Ecnomus, and was thereafter recalled to Africa to oppose Regulus.

But the greatest of all was Hamilcar, surnamed Barca or *Barak*, i.e., "lightning." While very young, he was appointed to the command of the Carthaginian forces in Sicily, in 247 B.C., at which time the Romans had possession of almost all the island. Hamilcar's first care was to discipline his infantry thoroughly; he then established himself on Mt. Ercte (now *Pellegrino*, near Palermo), and from this point made pillaging excursions in all directions, sending his privateers along the coast of Italy as far n. as Cumæ, thus obtaining abundant supplies for his troops. From this position the Romans endeavored to dislodge him, but in vain. After three years, he left Ercte; and established himself on Mt. Eryx, keeping up his communication with Drepanum, and the sea, where the same tactics were repeated on both sides, and with the same want of success on the part of the Romans. But the Carthaginian admiral having been totally defeated off the Aegates islands, 241 B.C., Hamilcar was compelled to abandon his fortress, and evacuate Sicily. While Hamilcar was engaged in Sicily, he had made large promises to his mercenary troops, which he was unable to perform; they revolted in consequence, and were joined by some of the African tribes. Hanno endeavored to suppress the revolt, but failed; Hamilcar was accordingly appointed to the command, and succeeded in utterly defeating the rebels, capturing all their towns, and putting to death their leaders. Hamilcar was next appointed commander-in-chief of the Carthagenian army, and was engaged for some time in wars with the neighboring tribes, which were abruptly ended by Hamilcar's entering upon his Spanish campaign in (probably) 236 B.C. His great aim was to found a new empire in Spain, from which, as his basis, he might assail the Romans. Such a kingdom he saw would increase the power and

wealth of his native country, and atone to her for the loss of Sicily and Sardinia. This his great purpose Hasdrubal and Hannibal endeavored to accomplish. He marched westward, while the fleet under his son-in-law, Hasdrubal, cruised along the coast; he then crossed over the strait of Gibraltar, and made war on the natives of Spain, in the course of which he penetrated to the very heart of the country, subdued many tribes and cities, and amassed immense wealth. He spent nine years in Spain, and at length, in 228 B.C., met his death on the field of battle while fighting against the Vettones. His military genius is considered scarcely inferior to that of his son Hannibal.

HAMILTON, a co. in n. Florida, n. and w. of Suwanee river, and intersected by the Allapaha, and crossed by the Atlantic and Gulf railroad; 400 sq.m.; pop. '70, 5,749—2,363 colored. The soil is level and sandy, and much of the surface is covered with forests. Cotton and corn are the chief products. Co. seat, Jasper.

HAMILTON, a co. in s. Illinois, crossed by the St. Louis and Southwestern railroad; 395 sq.m.; pop. '70, 13,014. The surface is mostly level, and the soil is fertile, producing corn, oats, wheat, etc. Co. seat, McLeansborough.

HAMILTON, a co. in central Indiana, on the w. fork of White river and Eagle and Cicero creeks, crossed by the Indianapolis, Peru and Chicago, and the Anderson, Lebanon and St. Louis railroads; 400 sq.m.; pop. '70, 20,882. Surface level; chief products: wheat, corn, hay, and pork. Co. seat, Noblesville.

HAMILTON, a co. in n. central Iowa, on Boone river, intersected by a section of the Illinois Central railroad; 576 sq.m.; pop. '75, 7,701. The surface is undulating prairie and woodland; chief productions: wheat, corn, oats, and hay. Co. seat, Webster City.

HAMILTON, a co. in w. Kansas on the Colorado border, intersected by Arkansas river and the Atchison, Topeka, and Santa Fé railroad; 975 sq.m.; formed after the census of 1870. The surface is undulating, and there is little timber. Co. seat, Syracuse.

HAMILTON, a co. in s.e. Nebraska on Platte river, drained by forks of the Big Blue; 500 sq.m.; pop. '76, 6,253. Surface mostly level; wheat, corn, oats, and hay are the chief products. Co. seat, Aurora.

HAMILTON, a co. in n.e. New York, mostly in the Adirondack wilderness at the headwaters of the Racket, Black, Hudson, and Sacondaga rivers; 1745 sq.m.; pop. '75, 3,482. The surface is rough, and there are a great number of small lakes and ponds. The soil is not well adapted to agriculture. Co. seat, Sageville.

HAMILTON, a co. in s.w. Ohio bordering on Indiana, crossed by the Miami, and bounded e. by Little Miami river; intersected by the various railroads that center at Cincinnati; 400 sq.m.; pop. '70, 260,370. The surface is moderately hilly, and the soil is very fertile. The main productions are corn, oats, hay, wheat, butter, pork, and wine. Co. seat, Cincinnati, the largest city in the state.

HAMILTON, a co. in e. Tennessee on the Georgia border, crossed by Tennessee river and by three or four railroads centering at Chattanooga; 575 sq.m.; pop. '70, 17,241—4,188 colored. The surface is mountainous, but the valleys are fertile, producing corn, wheat, etc. Coal and iron are found. Co. seat, Chattanooga.

HAMILTON, a co. in n. central Texas on Leon river; 850 sq.m.; pop. '70, 783—17 colored. Surface hilly, affording good pasturage. Cattle-raising is the main business. Co. seat, Hamilton.

HAMILTON, the seat of justice of White Pine co., Nev., 100 m. s. of Elko. It is at the foot of Treasure hill, in a barren region where water and timber are very scarce; pop. '70, 3,913. Its importance rises solely from the silver mines in the neighborhood.

HAMILTON, a t. in Madison co., N. Y., 29 m. s.w. of Utica on the Chenango canal and the Utica, Clinton, and Binghamton railroad; pop. '75, 370. The Madison university (Baptist) is in the town; also the Hamilton theological seminary, and the Hamilton female seminary.

HAMILTON, a city in Butler co., Ohio, on Miami river and canal, 20 m. n. of Cincinnati, with which it is connected by the Cincinnati, Hamilton, and Dayton railroad; pop. '70, 11,081. The city contains a number of important manufacturing establishments, such as iron foundries, flouring mills, etc. There are two parks, twelve churches, good schools, and a free library.

HAM'ILTON, a city of Canada in the province of Ontario, is situated at the w. end of lake Ontario, or rather of that detached section of it which, under the name of Burlington bay, is connected with the main body of the lake by the Burlington canal. Hamilton is 45 m. from the falls of Niagara, 38 from Toronto, and 378 from Montreal. It is situated in the very center of the finest grain-producing country in America, and it is also an important center of the chief Canada railways, the Great Western, the Hamilton and Toronto, and the Hamilton and Port Dover lines. The rapid increase of its population is remarkable. In 1841 it was about 3,500; in 1850, 10,312; in 1861, 19,096; and at the time of the last census, 1871, it amounted to 26,716. The Great Western railway and its branches have done much to advance its prosperity. The

manufacturing establishments of Hamilton are extensive; the principal are locomotive-works, foundries, and car-works. The city returns one member to the legislative assembly.

HAMILTON, a parliamentary and municipal borough, and market-town of Scotland, in the co. of Lanark, is beautifully situated on the left bank of the Clyde, in the center of a finely wooded district, about 11 m. s.e. of Glasgow, with which it is connected by railway. It has a straggling, but at the same time a pleasant rural appearance, many of the houses having a piece of garden-ground attached. The town contains some fine churches; numerous good schools—of which the academy and St. John's grammar school are the most important; the county-hall, a noticeable Grecian structure; a new town-hall; and extensive cavalry barracks. Many of the females are employed in *tambouring* for the sewed muslin manufacturers of Glasgow. Pop. '71, 11,299. Close to the town is Hamilton palace, the seat of the duke of Hamilton and Brandon, with the family mausoleum, in the midst of extensive pleasure-grounds bordered by the Clyde. The palace is a large and noble structure, and contains an excellent collection of paintings. On certain days the grounds are open to the public. Cadyow castle, and the remains of Cadyow forest, in which a herd of the famous aboriginal breed of wild cattle are kept, are in the vicinity.

HAMILTON, The Family of. This great historical family is known to be of English origin, but when or how it took root in Scotland has not been clearly ascertained. Some genealogists have sought to trace its lineage to Robert, surnamed Blanchmains, third earl of Leicester, who died in 1190. There is nothing improbable in the claim—the earl's second son was bishop of St. Andrews, he had other relations beyond the Tweed, and the cinquefoil on a bloody shield, which was the heraldic bearing of his house, seems from an early period to have been the heraldic bearing of the Scottish Hamiltons. But however probable such a descent may be, it wants proof. The name of the family, obviously territorial, was doubtless taken from some one of the many English manors called Hamilton, scattered through Buckinghamshire, Hampshire, Surrey, Lancashire, Rutlandshire, Yorkshire, and Leicestershire. In the 17th c. the Leicestershire Hamilton—a petty manor in the parish of Barkby, containing only a shepherd's cottage—was shown as the cradle of the house. Several persons of the name of Hamilton appear both in English and in Scottish records about the middle of the 13th c., and one of them seems to have held the Yorkshire manor of Hamilton, together with lands in the parish of Oxnam in Scotland. But the pedigree of the family cannot be carried beyond (1), "Walter Fitz-Gilbert (or Gilbertson) of Hamilton," who, in 1296, held lands in Lanarkshire, and swore fealty to king Edward I. of England as overlord of Scotland, and in 1314 kept the castle of Bothwell, on the Clyde, for the English. His early surrender of this strong fortress, and of the English knights and nobles who had fled to it from the field of Bannockburn, was rewarded by king Robert Bruce by grants of the lands and baronies of Cadyow and Machanshire in Clydesdale, Kinneil and Larbert in West Lothian, Kirkinner and Kirkowen in Galloway, and other lands forfeited by the Cumyns and other adherents of England. He attained the rank of knighthood, and married Mary, daughter of sir Adam of Gordon of Huntly, by whom he left two sons. The elder (2), "sir David Fitz-Walter Fitz-Gilbert," or, as he was sometimes more shortly called, "sir David Fitz-Walter," or "sir David of Hamilton," was taken prisoner by the English at the battle of Neville's Cross in 1346, founded a chantry in the cathedral of Glasgow in 1361, and appears among the barons in the Scottish parliaments of 1368, 1371, and 1373. His eldest son (3), "sir David of Hamilton of Cadyow," died before 1392, leaving by his wife, Janet of Keith, only daughter and heiress of sir William of Keith of Galston, five sons and a daughter. The eldest son (4), "sir John of Hamilton of Cadyow," married Janet, daughter of sir James of Douglas of Dalkeith, by whom he was the father of (5), "sir James of Hamilton of Cadyow," who, about 1422, married Janet, daughter of Alexander of Livingston of Callander, by whom he had (6) "sir James of Hamilton of Cadyow," and four other sons.

Lords Hamilton, Earls of Arran, Dukes of Chatelherault, Marquises of Hamilton, Dukes of Hamilton, Dukes of Brandon, etc.—Hitherto the family had been only knightly. It was ennobled in its sixth generation, in sir James of Hamilton of Cadyow, who, in 1445, was created lord Hamilton by a charter which erected his manor place of "the Orchard," in the barony of Cadyow, into his chief messuage, and gave it the name of Hamilton, which it still bears. It is to the praise of the first lord Hamilton that, in 1460, he founded a college in the university of Glasgow—the first college in Scotland founded by a layman. Allied both by marriage and by descent to the Douglases, he followed their banner in the beginning of their great struggle with the crown. But he forsook them at a critical moment in 1454, and his seasonable loyalty was rewarded by large grants of their forfeited lands, and, at a later period, when he must have been well advanced in years, by the hand of the princess Mary, the eldest daughter of king James II., and the widow or divorced wife of Thomas Boyd, the attainted earl of Arran. Lord Hamilton survived his marriage only five years, dying in 1478. His only son, James, second lord Hamilton, was, in 1503, made earl of Arran, and had a grant of that island, the dowry of his mother on her first marriage. After playing an important part in public affairs during the minority of king James V., he

died in 1529, being succeeded by the eldest son of his third wife (a niece of cardinal Beaton), James, third lord Hamilton, second earl of Arran. The death of king James V. in 1542 left only an infant of five days old between him and the throne. He was at once chosen regent of the kingdom and tutor to the young queen, and declared to be "second person in the realm"—a position which carried with it something of royal style. He signed or superscribed his name as "James G." or simply "James," and wrote himself "James, by the grace of God, earl of Arran and lord Hamilton, governor and prince of Scotland." He held his high offices till 1554, when he resigned them in favor of the queen-mother, Mary of Guise, receiving in return, from king Henry II. of France, a grant of the duchy of Chatelherault. His nearness to the throne, his great following, and large possessions, left him still a person of such mark that his eldest son, the earl of Arran, as he was called, was proposed at one time as the husband of queen Mary of Scotland, and at another time as the husband of queen Elizabeth of England. The career which opened with such high aspirations came to a sad and untimely end; the earl was afflicted with madness in 1562, and never recovered his reason, although he lived till 1609. His father, the first duke of Chatelherault, dying in 1575, his second son, lord John Hamilton, the lay-abbot or commendator of Arbroath, became virtual head of the house, and as such was, in 1599, created marquis of Hamilton. He died in 1604, being succeeded by his son James, the second marquis, who, in 1619, was created earl of Cambridge in England, and died in 1625. He was succeeded by his eldest son James, the third marquis; who led an army of 6,000 men to the support of king Gustavus Adolphus of Sweden in 1631–32, and a few years later acted a conspicuous part in the great contest between king Charles I. and the Scottish Covenanters. That king, in 1643, created him duke of Hamilton, with remainder to the heirs-female of his body, in the event of the death of himself and his brother without male issue. In 1648 he led a Scottish army into England for the king's relief, but was encountered and defeated by Cromwell at Preston, in Lancashire. He escaped from the field of battle, but soon afterwards was forced to surrender himself prisoner to the parliamentary forces. He was beheaded at Westminster in March, 1649, when he was succeeded by his brother William, who, in 1639, had been created earl of Lanark. He died in 1651 of the wounds which he had received at the battle of Worcester. The duchy of Hamilton, in terms of the patent of creation, now devolved on the daughter of the first duke, lady Anne, whose husband, lord William Douglas, earl of Selkirk, was, in 1660, created duke of Hamilton for life. He died in 1694. The duchess Anne, who survived till 1716, had, in 1698, resigned her titles in the king's hands in favor of her eldest son, James, earl of Arran, who was anew created duke of Hamilton with the precedency of 1643. In 1711 he was created duke of Brandon in England, but the house of lords refused him a seat or vote in parliament, on the ground that the crown was disabled by the act of union from granting a peerage of Great Britain to any person who was a peer of Scotland before the union. The duke was killed in a duel in Hyde park with lord Mohun in 1712. He was succeeded by his eldest son, James, who, dying in 1743, was succeeded by his eldest son, James, who, in 1752, married the famous beauty, Elizabeth Gunning, and died in 1758, being succeeded by his eldest son, James George, an infant of three years old. On the death of the duke of Douglas in 1761, the male representation of the "red" or Angus branch of the Douglases, with the titles of marquis of Douglas, earl of Angus, etc., devolved on the dukes of Hamilton, as descendants of the duchess Anne's husband, William, earl of Selkirk, third son of the first marquis of Douglas. Dying in 1769, in his 15th year, James George, seventh duke of Hamilton, was succeeded by his only brother, Douglas, who, in 1782, took his seat in parliament as duke of Brandon, the house of lords being now satisfied, after consultation with the twelve judges, that the act of union did not prohibit the crown from making a peer of Scotland a peer of Great Britain. Duke Douglas died without issue in 1799, when the titles and estates passed to his uncle, Archibald, the second son of James, the fifth duke. Duke Archibald, dying in 1819, was succeeded by his eldest son, Alexander, who, in 1810, married a daughter of Mr. Beckford, of Fonthill, and died in 1852, when he was succeeded by his only son, William Alexander Anthony Archibald, eleventh duke of Hamilton in the peerage of Scotland. He died in 1863, and was succeeded by William Alexander Louis Stephen Douglas Hamilton, the present duke, who was born in 1845.

Lords Paisley, Lords Abercorn, Earls of Abercorn, Lords Strabane, Viscounts Strabane, Viscounts Hamilton, Marquises of Abercorn, Duke of Abercorn, etc.—Lord Claud Hamilton, fourth son of the first duke of Chatelherault, was appointed commendator of the abbey of Paisley in 1553, created lord Paisley in 1587, and died in 1622. During his life, his eldest son, James, was made lord Abercorn in 1603, and earl of Abercorn in 1606. He had large grants of lands in Ulster; and dying in 1618, was succeeded by his eldest son, James, who in 1616 had been created lord Strabane in the Irish peerage. The sixth earl of Abercorn was, in 1701, created viscount Strabane in the peerage of Ireland. The eighth earl of Abercorn, then one of the 16 Scottish representative peers, was, in 1786, created viscount Hamilton, in the peerage of Great Britain; when the house of lords found, by a vote of 52 to 38, that a peer of Scotland who had been created a peer of Great Britain, could not sit in parliament as a representative of the peerage of Scotland. His nephew, the ninth earl of Abercorn, was, in 1790, created

marquis of Abercorn. It was ruled in his case, by the house of lords, in 1793, that a peer of Scotland, who had been created a peer of Great Britain, was entitled to vote in the election of the Scottish representative peers. On the death of the second duke of Hamilton in 1651, the second earl of Abercorn had claimed the male representation of the house of Hamilton; and in 1861, the second marquis and tenth earl of Abercorn (created duke of Abercorn in 1868), was served heir-male of the first duke of Chatelherault, in the sheriff court of chancery at Edinburgh, under protest by the duke of Hamilton, Brandon, and Chatelherault. The duke of Abercorn is one of three peers who hold peerages in Scotland, in Ireland, and in Great Britain; the others being the marquis of Hastings (earl of Loudoun in Scotland, lord Grey de Ruthyn, etc. in England, earl of Moira in Ireland, lord Rawdon in Great Britain); and the earl of Verulam (lord Forrester of Corstorphine in Scotland, viscount Grimstone in Ireland, lord Verulam in Great Britain). The house of Abercorn gave birth, in 1646, to Anthony Hamilton (q.v.), the author of the charming *Mémoires du Comte de Gramont.* He was the grandson of the first earl of Abercorn.

Earls of Selkirk.—Lord Charles Hamilton, third son of Anne, duchess of Hamilton, was, in 1688, on his father's resignation of the title, created earl of Selkirk, with the precedency of 1646. Dying childless in 1739, he was succeeded by his brother, lord John Hamilton, earl of Ruglen, who died without male issue in 1744, when the title of earl of Selkirk passed to his grand-nephew, Dunbar Hamilton of Baldoon (the grandson of lord Basil Hamilton, sixth son of Anne, duchess of Hamilton). He died in 1799, and was succeeded by his son Thomas, who, dying in 1820, was succeeded by his son Dunbar James, the present and sixth earl.

Earls of Orkney.—Lord George Hamilton, fifth son of Anne, duchess of Hamilton, was, in 1696, created earl of Orkney, with remainder to the heirs whatsoever of his body. Dying in 1737, he was succeeded by his eldest daughter, whose great-great-grandson, Thomas John Hamilton Fitzmaurice, is now fifth earl of Orkney.

Earls of Ruglen.—Lord John Hamilton, fourth son of Anne, duchess of Hamilton, was, in 1697, created earl of Ruglen, with remainder to the heirs whatsoever of his body. He succeeded to the title of earl of Selkirk on the death of his brother in 1739, and died in 1744, when the title of earl of Selkirk went to his grand-nephew, and the title of earl of Ruglen went to his eldest daughter, Anne, the widow of William, second earl of March. On her death in 1748, the earldom of Ruglen devolved on her son, William, earl of March, afterwards fourth duke of Queensberry; and on his death in 1810, the title of earl of Ruglen became extinct.

Earls of Haddington.—Sir Walter Fitz-Gilbert, the first ascertained ancestor of the house of Hamilton, had a brother, sir John of Hamilton of Roosaven, the progenitor of the family of Fingalton and Preston, which, in 1788, gave birth to sir William Hamilton, the famous scholar and philosopher; and of the family of Innerwick, which, in 1563, gave birth to sir Thomas Hamilton, nicknamed "Tam of the Cowgate," one of the ablest and most learned of Scottish lawyers. He was created lord Binning and Byres in 1613, and earl of Melrose (a title afterwards changed into Haddington) in 1619. His descendant, George Arden Baillie Hamilton, is now eleventh earl of Haddington.

Lords Bargeny.—Sir John Hamilton of Bargeny and Carriden, the illegitimate grandson of the first marquis of Hamilton, was, in 1639, created lord Bargeny. The title became dormant or extinct on the death of the fourth lord in 1736.

Lords Belhaven and Stentoun.—Sir James Hamilton of Biel married a natural daughter of the second marquis of Hamilton, and was, in 1647, created lord Belhaven and Stentoun, with remainder to his heirs-male whatever. He resigned the title in 1675, when he had a new patent creating him lord Belhaven and Stentoun for life, with remainder after his death to the husband of one of his granddaughters John Hamilton (son of Robert Hamilton of Barncluith, a judge of the court of session). This gentleman, who succeeded to the title and estates in 1679, distinguished himself by his wild but eloquent speeches against the union. He died in 1708, and was succeeded by his son John, who, being drowned in 1721, was succeeded by his son John, who died in 1764, and was succeeded by his brother James, who died in 1777. On his death, the great estates of the family passed to Mrs. Mary Hamilton-Nisbet, wife of Mr. Nisbet of Dirleton, and are now possessed by her granddaughter, lady Mary Bruce-Nisbet Hamilton. The titles were, in 1799, adjudged by the house of lords to William Hamilton of Wishaw (as descended from the house of Barncluith). His son, Robert Montgomery Hamilton, 7th lord Belhaven and Stentoun, was, in 1831, created lord Hamilton of Wishaw in the peerage of the United Kingdom. The title became dormant in 1868, but was adjudged in 1875 to James Hamilton, who thus became the ninth lord.

Viscounts Boyne.—Gustavus Hamilton, the grandson of lord Claud Hamilton, first lord Paisley, was, in 1715, created lord Hamilton of Stackallan, and, in 1717, viscount Boyne, in the peerage of Ireland. His descendant, Gustavus Frederick Russell Hamilton Russell, created in 1866 baron Brancepeth in the peerage of the United Kingdom, is now the 8th viscount.

Viscounts of Clanboy, Earls of Clanbrassil, etc.—James Hamilton, son of Hans Hamilton (a natural son of Archibald Hamilton of Raploch), vicar of Dunlop, in Ayrshire, settled in Ireland about 1587, and, in 1622, was created viscount of Clanboy.

His son James was created earl of Clanbrassil, and dying in 1659, was succeeded by his son Henry, on whose death, in 1675, the title became extinct. It was revived, nearly a century afterwards, in favor of his kinsman, James Hamilton of Tullimore (the grandson of Hans Hamilton, vicar of Dunlop), who in 1719 had been created viscount Limerick and lord Clanboy, and in 1756 was made earl of Clanbrassil in the peerage of Ireland. On the death of his son James in 1799, the titles became extinct. His estates went to his sister Anne, countess of Roden, whose grandson, Robert, earl of Roden, was, in 1821, created lord Clanbrassil in the peerage of the United Kingdom.

A *Briefe Account of the Family of Hamilton*, written by Dr. James Baillie of Carnbroe, during the first half of the 17th c., is preserved among the MSS. in the advocates' library at Edinburgh. A *History of the House of Hamilton*, written about sixty years afterwards by Hamilton of Wishaw, is not now known to be extant. *Memoirs of the Lives and Actions of James and William, Dukes of Hamilton and Chatelherault*, by Gilbert Burnet, afterwards bishop of Salisbury, were published in 1677. Mr. John Anderson, surgeon at Hamilton, published *Historical and Genealogical Memoirs of the House of Hamilton* in 1825, in 1 vol. 4to.

HAMILTON, ALEXANDER, a celebrated American statesman, b. Jan., 1757, in the West Indian island of Nevis, was the son of a Scotch merchant who had married a young French widow. His father soon failed in business, and Alexander, at the age of twelve, had to enter the counting-house of a rich American merchant, named Cruger. His extraordinary abilities, however, induced some of his friends to procure for him a better education than could be got at home. He was accordingly sent to a grammar-school at Elizabethtown, N. J.; and shortly afterwards entered Columbia college, New York. On the first appearance of disagreement between Great Britain and her colonies, Hamilton, still a schoolboy, and barely 18, wrote a series of papers in defense of the rights of the latter, which were at first taken for the production of the eminent statesman Jay, and which secured for the writer the notice and consideration of the popular leaders. On the outbreak of the war, he obtained a commission as captain of artillery, gained the confidence of Washington, was made his aid-de-camp in 1777, and acquired the greatest influence with him as his friend and adviser.

In 1780 he married a daughter of gen. Schuyler, who was a member of a very old family. On the termination of the war, he left the service with the rank of col., and, betaking himself to legal studies, soon became one of the most eminent lawyers in New York. In 1782 he was elected by the state of New York a representative at the continental congress; in 1786 he became a member of the New York legislature; and in 1787 he was appointed one of the delegates to the convention which met at Philadelphia, for the purpose of revising the articles of confederation. In conjunction with Madison, he had the most important share in drawing up the constitution afterwards adopted. He was a strong supporter of the federal, as opposed to the democratic party; and, along with Jay and Madison, defended the constitution against all attacks, by a series of letters in the *Daily Advertiser* of New York, afterwards collected and published under the title of *The Federalist*. Fifty-one out of the 85 numbers of which the work is composed were written by Hamilton. On the establishment of the new government in 1789, with Washington as president, Hamilton was appointed secretary of the treasury. The disorder of the public credit, and the deficiency of official accounts of the state treasure, rendered this office one of peculiar difficulty. In order to re-establish public credit, he carried, in spite of much opposition, a measure for the funding of the domestic debt, founded a national bank, rearranged the system of duties, and altogether showed himself one of the very greatest of American financiers. In 1795 he resigned his office, and resumed the practice of law in New York. When the war with France broke out in 1798, he was, according to the wish of Washington, made maj.gen. of the U. S. army; and, on the death of Washington, he succeeded to the chief command. When peace was restored, he returned to his civil duties, but became involved in a political quarrel with Aaron Burr. This difference unhappily culminated in a duel, in which Hamilton received a wound, of which he died the following day (July 12, 1804).

His writings, exclusive of *The Federalist*, have been published in 7 vols. by his son, John C. Hamilton.

HAMILTON, ALEXANDER (*ante*), ranks next to Washington among the statesmen of the period immediately following the war of the revolution. Jefferson transcended him neither in patriotism nor ability, but only in a clearer recognition and bolder assertion of popular rights as against established precedents. He played a part in the formation and early administration of the national government, without which it is at least doubtful whether it would have proved a success. If in some respects he was too conservative to suit the prevailing tendencies of the period, it is probable that for that very reason he was all the better qualified to guide the country in its transition from the ancient subserviency to the new independence. No man saw more clearly than himself the necessity of throwing off the yoke which Great Britain sought to impose upon the colonies, and few if any rendered more valuable service than he in the cause of independence; and his distrust of democracy as expounded and applied by Jefferson was no doubt shared by many of the lights of that day, including Washington himself. He espoused

the national cause with all the ardor of youthful patriotism, but when the time came to organize the new government he was fearful of too wide a departure from the ancient British models. He first attracted public notice by a remarkable political speech which he delivered when only 17 years of age, while he was a student in Columbia college, and in the next two years his writings in defense of the American cause displayed such ability that, in part at least, they were for a time attributed to John Jay. He enlisted as a soldier early in 1776, and was commissioned as a capt. of artillery. He soon attracted the notice of Washington, who at once recognized his extraordinary ability. He took part in the battle of White Plains, shared the retreat of the American forces through New Jersey, and fought at Trenton and Princeton. In March, 1777, he accepted the appointment of aid-de-camp on Washington's staff, and was of great assistance to him in the conduct of his large and very perplexing correspondence. The commander-in-chief indeed found in him, in spite of his youthfulness, an adviser on whose judgment in the most delicate and confidential matters he could safely rely. He took part in the battles of Brandywine and Germantown, and spent the winter with his chief at Valley Forge. He was present at the battle of Monmouth in 1778, and in the duel which followed between Laurens and Lee, acted as second of the former. When the French admiral D'Estaing arrived at Sandy Hook, Hamilton was sent to confer with him as to the part he was to take in the war. He was at West Point when Arnold's treachery was discovered, and earnestly advised Washington to yield to Andre's request to be shot and not hung. In 1780 he married a daughter of Philip Schuyler, and shortly afterwards, taking offense at what he thought an undeserved rebuke from Washington, tendered his resignation upon the spot, and refused to withdraw it, notwithstanding Washington made an apology. This occurrence, however, did not permanently interrupt their friendly relations. Hamilton was appointed commander of a New York battalion, and at the siege of Yorktown led a successful assault upon one of the British outworks. In 1782, having studied for a time with his father-in-law in Albany, he was admitted to the bar. He was shortly afterwards elected by the legislature of New York a delegate to the continental congress, in which capacity he took an active part in the settlement of important questions growing out of the war. He was one of the first to see the utter inadequacy of the articles of confederation as the framework of a national government. After the evacuation of New York by the British, he resigned his seat in congress and entered upon the practice of the law in that city. A large number of tory lawyers having been excluded from practice by act of the legislature, the young attorney found a wide field open before him, and at once achieved a marked success. He distinguished himself especially in certain suits arising out of the war, in which he took a position opposed to the public sentiment of the time, defending it with masterly ability and convincing the judgment of the court. From the first he displayed remarkable ability in handling questions of finance, and naturally enough took an active part in establishing the bank of New York. He was also one of the founders of the New York manumission society, sharing the hostility to slavery common among the most eminent patriots of his time. He also took an honorable part in the settlement of the differences between New York and Vermont, by which the latter became an independent state. His services in the convention of 1787, which framed the constitution of the United States, were of the highest value. He saw that the articles of confederation were a rope of sand, and that it was impossible to organize under them a government that would foster the instinct of nationality and command the respect of the world. His colleagues from New York were strongly opposed to him, and there was in the convention a morbid hostility to any plan tending to dwarf the powers of the states. By his efforts and those of other men likeminded, the tide was turned at length in favor of a national government that should rest upon the authority not of the states but of the people, and that should have power to defend itself alike against foreign and domestic foes. He offered a written sketch of such a government, differing in many respects from the one afterwards adopted, but illustrating the conservatism of the period. He was absent from the convention for a time, and, before he returned, his New York colleagues, finding the sentiment of the body turning in favor of a strong national government, resigned their seats in disgust, leaving him to represent the state alone. The constitution finally adopted did not wholly satisfy him, but when he saw that it was the best that could be obtained he supported it warmly; and no other man probably did so much as he to secure its ratification by the people. The series of 85 papers known under the title of *The Federalist*, of which 63 were written by him, no doubt served to commend the constitution to popular favor. These papers are still an authority upon many of the subjects therein discussed, and well deserve the place they hold in the political literature of the nation. Madison and Jay took part with Hamilton in their composition, though they were for the most part his own work. When Washington was chosen president, he selected Hamilton for secretary of the treasury—a post for which he was especially fitted, and in which his services were of the highest value to the country. He successfully resisted every scheme for repudiating the national debt, thus establishing the credit of the nation upon a stable foundation. Some of the measures he proposed met with a stubborn resistance, but he carried most of them successfully through. His funding system won the support of the moneyed and mercantile classes, as did also the national bank which he proposed, though the latter was

denounced in influential quarters as dangerous to popular liberty. Upon this and some other questions he encountered the opposition of Jefferson, between whom and himself a bitter controversy arose, which led to the retirement of the former from the cabinet. It deserves to be mentioned that the policy of so imposing duties on foreign imports as to afford protection to American manufactures, was advanced by Hamilton in a report which he presented at the first session of the second congress. Having succeeded in putting into operation the plans he had proposed, and finding his salary inadequate to his support, he resigned at the end of six years of service, Jan. 31, 1795, and resumed the practice of the law. He was still, however, a zealous supporter of Washington's administration, using his pen efficiently to sustain the measures it proposed. Washington, when about to prepare his farewell address to the country, sought and received Hamilton's advice, and it is by no means improbable, in view of the well-known relations of the men, that the latter assisted in the preparation of that celebrated paper. Hamilton did not escape imputations upon his integrity as secretary of the treasury. An attempt was made to prove that he had taken advantage of his official position for speculative purposes. He defended himself against these charges with entire success, but in doing so made an admission that left a stain of another sort upon his private character. Letters of his to a well-known speculator, implying confidential relations between them, were produced to confirm the current suspicion. Hamilton saw that he could not successfully defend himself without explaining the occasion of the letters in question, which he did in the frank confession that they had grown out of an intrigue with the wife of his correspondent. To save his character for official and political integrity, which had been falsely assailed, he acknowledged himself guilty of what he doubtless thought a more excusable offense. In consequence of the apprehensions of war with France, growing out of the ratification of Jay's treaty, measures were taken in 1798 to augment the army of the United States, and Washington was appointed commander-in-chief with the title of lieut.gen. He accepted the position on condition that he should not be called into the field, except in case of actual hostilities, and that Hamilton as maj.gen. should attend to the work of organizing the army. After the death of Washington in 1799, Hamilton was appointed commander-in-chief; but the war-cloud passed away, and he resumed the practice of the law in New York. He was, however, a conspicuous leader of the federal party, and took an active part in the political controversies of the time. Aaron Burr was a leader of the democratic party, and there sprang up between the two men a hostility which neither cared to disguise. Burr, embittered by his failure to be elected president, partly through Hamilton's influence, sought an election as governor of New York, hoping for success by the help of the federalists. But here again the influence of Hamilton barred his way, and he was defeated. In his exasperation he called upon Hamilton to disavow certain expressions derogatory to himself which he was assumed to have uttered. Failing to procure the desired disavowal, he challenged Hamilton. The latter felt himself compelled, for reasons of a public nature, to accept the challenge, and the duel was fought at Weehawken, July 11, 1804, and Hamilton at the first fire was mortally wounded, dying the next day. His death had the effect of rousing a public sentiment against dueling such as had not before existed in the northern states. Burr lived for 32 years after this, but with the stigma upon his character from which he never recovered. By multitudes he was denounced and shunned as a murderer. Hamilton's widow died in 1854 at the age of 97. His son, John C. Hamilton, wrote his life and compiled his works; the former (in 2 vols., 8vo.) in 1851. On Nov. 23, 1880, a granite statue of Hamilton was unveiled in Central park, New York, in the presence of members of the society of the Cincinnati, of gen. U. S. Grant, ex-gov. Bullock of Massachusetts, the mayor of the city, and of other distinguished personages, besides a large concourse of spectators. The statue is the work of Charles Conrads, and was presented to the city of New York by John C. Hamilton, a son of Alexander Hamilton. Talleyrand, when in New York, on seeing Hamilton at work late at night in his office, said of him: "I have seen one of the wonders of the world. I have seen a man laboring all night to support his family, who has made the fortune of a nation." And again: "I consider Napoleon, Fox, and Hamilton the three greatest men of our epoch, and without hesitation I award the first place to Hamilton."

HAMILTON, ANDREW, d. 1703 in New Jersey. He was of Scottish birth, and was governor of the colony of New Jersey from 1692 to 1701; afterwards lieut.gov. of Pennsylvania. He was the author of the earliest scheme for establishing post-offices in the colonies.

HAMILTON, ANTHONY, Count de, descended from the Scottish ducal family of that name, was b. in Ireland in the year 1646. After the execution of Charles I. he, with his parents, followed the royal family to France. On the accession of Charles II. in 1660, he returned to England, but was excluded from office for being a Catholic. James II. gave him a regiment of infantry in Ireland, and made him governor of Limerick; but after the abdication of that monarch, Hamilton returned to France, where he passed the rest of his life, and died at St. Germain-en-Laye in 1720. His writings are full of wit and talent, particularly his *Contes de Féerie* (3 vols., Paris, 1805). His *Mémoires de Grammont* is a lively and spirited production, exhibiting a free and faithful delineation

of the court of Charles II. It has been often translated into English. The last edition is that in *Bohn's Series*, with Scott's notes and illustrations. One of the best editions of his collective works is that published by Renouard (3 vols., Paris, 1812).

HAMILTON, CHARLES S., b. New York, 1822; graduated at West Point; served with credit in the Mexican war, and on the union side in the war of the rebellion, rising to the grade of maj.gen. of volunteers. He resigned two years before the close of the war, and engaged in manufacturing at Fond du Lac, Wis.

HAMILTON, ELIZABETH, 1758–1816; b. Ireland. She was brought up and educated in Scotland by an aunt. In her 15th year she made a tour in the Highlands with some friends and wrote a journal of it for her aunt's perusal, which was inserted, unknown to the author, in a provincial magazine. In 1785 she made her first voluntary contribution to the press in a letter to the *Lounger*. She produced her *Letters of a Hindu Rajah* in 1796, and soon after with her sister, Mrs. Blake, published the *Memoirs of Modern Philosophers*, a satire on the admirers of the French revolution. In 1801–2 the *Letters on Education* appeared, her most valuable though not her most popular work. After traveling through Wales and Scotland for nearly two years, the sisters took up their abode in 1803 in Edinburgh. In 1804 Mrs. Hamilton, as she then preferred to be called, published her *Life of Agrippina, wife of Germanicus;* and in the same year she received a pension from government. About this time she took charge of a widowed Scotch nobleman's family; and to his eldest daughter were addressed *Letters on the Moral and Religious Principle*, published in 1806. Her next publication of importance, *Cottagers of the Glenburnie*, appeared in 1808. This work, to which the author owes most of her fame, is an admirable description of the failings of the Scotch peasantry in their home life. Her subsequent works were a supplement to her *Letters on Education*, under the name of *Popular Essays on the Elementary Principles of the Human Mind, and Hints addressed to the Patrons and Directors of the Public Schools.*

HAMILTON, Lady EMMA LYON, 1764–1815; wife of sir William Hamilton, the antiquary. She was the natural child of a servant girl; was employed as nurse, then as sales clerk, then as chambermaid to a titled lady, then as waitress in a tavern, and then for some years she was the mistress of a sea-captain. The captain resigned her to a friend, who deserted her, and she was engaged to represent the figure of the goddess of Hygeia in a quack doctor's show. Her next affinity was Charles Greville, of an old family in Warwickshire; to whom she bore three children. He wanted to marry her but his uncle (sir William Hamilton) opposed the union. But as soon as the uncle saw her he fell desperately in love himself. The nephew then sold her to his uncle, the latter agreeing to pay the former's debts. Not long after sir William married her, and as his wife presented her at the court of Naples. Here she formed a *liaison* with lord Nelson with her husband's connivance. She was concerned in the political conflicts of the time, and obtained possession of a letter written by Charles IV. of Spain to his brother the king of Naples, in which he accused the English of various misdeeds. This letter she sent to London, which act brought on a war in which the English severely punished the Spaniards. Returning to England, the adventuress found a very cold reception, chiefly on account of her relations with Nelson, who had resigned to be constantly at her feet. She had one daughter to whom she gave the name Horatia Nelson. When both husband and lover died she was left poor, and not long after went to France, where she died in want. Her daughter married a clergyman. Lady Hamilton was a remarkably beautiful woman, and so captivated the painter, Romney, that he is said to have represented her in twenty-three of his works.

HAMILTON, GAVIN, 1730–97. At an early age he was sent to Rome, where he studied painting under Massuchi. His best pieces are designed from the *Iliad*, such as "Achilles beside the dead body of Patroclus," "Andromache bewailing the Death of Hector," and "Helen and Paris." Hamilton, however, has rendered greater service to art by his discoveries of precious fragments of ancient monuments than by his direct contributions to it. The latter part of his life was devoted to researches of this kind, which he prosecuted in various parts of the Roman states, but especially at Civita Vecchia, Velletri, Ostia, and above all at Hadrian's villa, at Tivoli. The statues, busts, and bas-reliefs found by him form the most interesting portion of the museo Clementino, after the treasures of the Belvidere. Many collections in England, Germany, and Russia, owe their chief ornaments to his labors. To one of the best of these—the Townley gallery—Hamilton contributed a large number of valuable marbles, a list of which is given in the *Townley Gallery*, published by the society for the diffusion of useful knowledge.

HAMILTON, JAMES, 1786–1857; b. S. C.; educated to the law; served in the army during the war of 1812 as a maj. of militia, but afterwards began the practice of his profession. While mayor of Charleston in 1822 he discovered and frustrated a plan for an insurrection of slaves. He was in the South Carolina legislature, and in congress, where he was John Randolph's second in the duel with Henry Clay. In the nullification period, 1830–32, he was governor of South Carolina, and strongly urged the adoption of the nullification ordinance. At a later era he was minister from Texas (before annexation) to England and France, both of which nations acknowledged the independence of the "lone star" republic. He lost his life in a steamboat collision.

HAMILTON, PATRICK, one of the most prominent precursors of the Scottish reformation, was a younger son of sir Patrick Hamilton of Kincavel and Stanehouse, and of Catherine Stewart, daughter of Alexander, duke of Albany, second son of king James II., and, in all probability, was b. in the year 1504, and in the city of Glasgow. He was educated at the university of Paris, where he took his degree in 1520, after which he proceeded to Louvain, where he remained for some time, and thence removed to Basel in 1521.

When Hamilton settled in St. Andrews in 1523, he brought with him the new tastes and interests which he had learned to cherish. For some time, his opinions attracted no particular attention. He quietly pursued his theological studies, and did not as yet venture to put himself forward as a reformer. He had been appointed in his boyhood abbot of Ferne, and although he never went into residence or lived as a monk, he was content to enjoy the advantages and dignity of his ecclesiastical position. But gradually his convictions matured. From agreeing with Erasmus, he came to agree with Luther; and about 1526 he appears to have announced his new views in such a manner as to draw the notice of the archbishop Beaton. Early in 1527 Beaton made "inquisition" into the grounds of the rumor against him, and found that he was "infamed with being disputing, holding and maintaining diverse heresies of Martin Luther and his followers, repugnant to the faith," and thereupon proceeded to "desire" him to be formally summoned and put to trial. In the following year he carried out his summons by a professed trial and conviction, declaring him to be worthy of death. In the meantime Hamilton had fled to Germany, where he became familiar with Luther and Melancthon. The Protestant education of Hamilton was in this manner very complete. Such a man, while he became a reformer, became one in no sectarian sense. His doctrinal opinions were characterized by something of the cosmopolitan breadth which marked his training, and by a scriptural simplicity befitting his honest and persevering spirit of inquiry. The substance of his doctrines has been fortunately preserved by his own pen under the title of *Patrick's Places;* and simplicity, combined with comprehension and aphoristic brevity, may be said to be the chief characteristics of them.

After a residence of six months, Hamilton returned to his native country. He repaired to the family mansion at Kincavel, and there, in the neighborhood of Linlithgow, openly preached the gospel. What is more remarkable, he is supposed, during this brief period of quiet and retirement at Kincavel, to have married. It is somewhat strange that, following such an event, he should have been induced to quit his retirement, where he was in comparative safety, and proceed to St. Andrews. Beaton, however, contrived to allure him within his grasp. He "travailed with the said Mr. Patrick," Knox says, "that he got him to St. Andrews." Hopes seem to have been held out of some good being effected by a conference with him as to the state of the church and its need of reformation; for "reformation" of some kind was a common talk at this time in the church, and many plans were considered, and some attempted for carrying it out.

Hamilton arrived at St. Andrews in Jan., 1528, and took up his abode in a lodging provided for him by the archbishop. A conference was held, in which his opponents showed a conciliatory spirit, and even to some extent expressed concurrence in his views. No advantage appears to have been taken of his former summons and condemnation. He was allowed openly, for some time, to promulgate his sentiments in the city and university. With all visitors he freely conversed, and among these, with Alexander Alane or Alesius, at this time one of the canons in the priory, and with Alexander Campbell, one of the Dominican friars, "a young man of good wit and learning," suborned, it is alleged, by Beaton, to entrap him into avowals of heretical opinion. After a month or so (*plus minus mensem*, says Alesius), he was summoned to answer before Beaton to a charge of heresy. The trial took place on the last day of Feb. and the result, in spite of his luminous and unanswerable argument was, that Hamilton was condemned for divers heresies and "detestable opinions"—deprived of all dignities and benefices in the church, and delivered over to the secular power to be punished. The sentence was carried out without delay. The warrant of the secular power must have been already secured, for on the very same day on the morning of which he was tried, Hamilton was consigned to the stake in the front of the gate of St. Salvador's college. He died as he had lived, a humble, earnest, heroic man. His character, if it scarcely attained to greatness in his brief lifetime, yet shines with a chastened and magnanimous luster through the fires of his early martyrdom. His death probably did more to extend the reformation in Scotland than even his life could have done. The "reik of Mr. Patrick Hamilton," said one of Beaton's own retainers, "has infected as many as it did blow upon."

HAMILTON, ROBERT, 1743–1829; a Scottish writer on finance, educated at the university of Edinburgh. Although desirous of following a literary life, he entered a banking-house in order to acquire a practical knowledge of business. In 1769 he gave up business pursuits and accepted the rectorship of Perth academy. In 1779 he was presented to the chair of natural philosophy at Aberdeen university. For many years, however, by private arrangement with his colleague, prof. Copland, Hamilton taught the class of mathematics. In 1817 he was presented to the latter chair. For some years before his death he had retired from the active business of his chair, and quitted his

privacy only at rare intervals, to take part in important affairs concerning the college. Hamilton's most important work is the *Essay on the National Debt*, which appeared in 1813. A posthumous volume published in 1830, *The Progress of Society*, is also of great ability, treatment of economical principles by tracing their natural origin and position in the development of social life.

HAMILTON, SCHUYLER, b. New York, 1822; grandson of Alexander; graduated at West Point; served (and was twice wounded) in the war with Mexico; resigned from the regular army in 1856; went into the union army as a private in 1861, and in 1862 was maj.gen. of volunteers; was prominent in several engagements. He has published a *History of the National Flag*.

HAMILTON, WILLIAM, 1704–54; a Scottish poet, author of *The Braes of Yarrow;* probably studied at the university of Edinburgh; an associate in years after with Allan Ramsay and Henry Home. As early as 1724 he contributed to Ramsay's *Tea Table Miscellany*. In 1745 Hamilton joined the cause of prince Charles, and, though it is doubtful whether he actually bore arms, he certainly celebrated the battle of Prestonpans in an ode beginning—*As over Gladsmuir's bloodstained field*. After the disaster of Culloden he lurked for several months in the highlands, and at length escaped to France; but in 1749 the influence of his friends at home procured him permission to return to Scotland, and in the following year he obtained possession of the family estate at Bangour.

HAMILTON, Sir WILLIAM, grandson of William, third duke of Hamilton, b. in Scotland in 1730, was, in 1764, appointed English ambassador to the court of Naples. During his residence there, he took an active part in the excavation of the ruins of Herculaneum and Pompeii, and collected a rare assortment of art-relics, consisting chiefly of Greek and Etruscan antiquities, which was afterwards purchased for the British museum. He was recalled to England in 1800; but while on his way home the vessel in which he sailed was unfortunately wrecked, and a great part of his collection of antiques lost. Drawings of these had, however, been preserved, which were afterwards published in his *Antiquitiés Etrusques, Grecques, et Romaines, tirées du Cabinet de M. Hamilton* (4 vols. Naples, 1766). He also published *Observations on Mount Vesuvius, Mount Etna*, etc. (Lond. 1772); *Campi Phlegraei* (Naples, 1776–77), etc.; besides some papers in the *Philosophical Transactions* (Lond. 1767–1795). Hamilton's claim on the British government for special services was disallowed, and he died at London in comparative poverty, April 6, 1803. The wife of Hamilton was the notorious lady Hamilton, whose name figures unpleasantly in the biography of lord Nelson. She died at Calais in 1816, and her memoirs have been published.

HAMILTON, Sir WILLIAM, of Preston, bart., the most learned and scientific philosopher of the Scottish school, was b. Mar. 8, 1788, at Glasgow, where his father, Dr. William Hamilton, and his grandfather, Dr. Thomas Hamilton, held in succession the chairs of anatomy and botany. Though the Hamiltons of Preston (Haddingtonshire), who were raised to a baronetcy in 1673, had not assumed their title since the death of sir William Hamilton in Nov., 1688, when his brother and heir, sir Robert, the covenanter, refused to take the oath of allegiance, the philosopher made good his claim to represent them, and therefore to be descended from the leader of the covenanters at Drumclog and Bothwell Bridge. After gaining high distinction, especially in the philosophical classes, at Glasgow, he went in 1809 to Balliol college, Oxford, as a Snell exhibitioner, and there, notwithstanding the unusually high standard of scholarship at the time, the position which he took never had, nor has been surpassed. It was at this time, moreover, that he laid the basis of his vast erudition in mediæval and modern, as well as in ancient literature, and he himself felt that his residence in Balliol was the most important period of his life in determining the drift of his subsequent speculations and studies (see *Discussions*, 2d ed., p. 750, *note*). He left Oxford in 1812, and entered the Scotch bar in 1813, but he seems never to have had any practice in his profession except what became incumbent on him afterwards, on being appointed crown-solicitor of the court of teinds. In 1820, on the death of Dr. Brown, he was an unsuccessful competitor for the chair of moral philosophy in Edinburgh. In the following year, however, Hamilton was appointed to the professorship of history by its patrons, the faculty of advocates.

Hamilton had now reached his 30th year, without giving to the world any indication of those speculations which he had been silently and slowly maturing. But in 1829 there appeared in the *Edinburgh Review* a critique of Cousin's *Cours de Philosophie* of the previous year, in which was developed that philosopher's doctrine of the infinite. The critique immediately excited admiration not only among the few in our island who comprehended it, but much more extensively on the continent, Cousin himself being among the first to acknowledge that his reviewer at once understood thoroughly the theory which he opposed, and combated it with a speculative power, with a knowledge of philosophical systems, and a command of philosophical expression, which he had not expected to find existing in Britain. For some years after this, Hamilton was a regular contributor to the *Edinburgh Review*. Besides other philosophical articles, two of which, on the "Philosophy of Perception," and on "Recent Publications in Logical Science," are especially celebrated, he contributed several on education and university reform.

Many of these contributions, besides being republished in Mr. Crosse's *Selections from the Edinburgh Review*, were translated into German, French, and Italian, the French collection, *Fragments de Philosophie*, being especially valuable for the introduction, appendix, and notes of its editor, M. Peisse. In 1852 they were all edited by Hamilton himself, with large notes and appendices, under the title of *Discussions in Philosophy and Literature, Education, and University Reform*. In 1836, after a severe contest, Hamilton was elected to the chair of logic and metaphysics in Edinburgh. During his first session, he delivered a course of lectures on metaphysics, which was followed in the succeeding session by a course on logic; and these two courses he continued to read on each alternate year till the close of his life. His influence soon began to show itself in the university among the young men who were attracted thither from different parts of Scotland, and other countries, in many cases chiefly for the sake of hearing Hamilton; and many of his pupils now rising to distinction in various professions, trace to the impulses which issued from his class the most valuable element of their education. Extensive notes of his lectures were taken by his students, and numerous copies of them, transcribed from shorthand reports, were in circulation during the later years of his life. Since his death they have been published under the editorship of professors Mansel and Veitch (*Sir William Hamilton's Lectures*, 4 vols. 1859–61.) These lectures, which were mostly written during the currency of the sessions in which they were first delivered, want the exactness of thought and expression which render the works revised by himself for publication models of philosophical composition; but this may be said to convey higher value to them as introductory works. Still it is to be regretted that the materials embodied in these volumes were never, as was intended, wrought into another work which Hamilton had already planned at the time of his appointment. This was his edition of the works of Reid, with notes and supplementary dissertations. It is perhaps impossible to adduce any writings which have received the same amount of editorial care. The general aim of Hamilton's whole philosophy is, in fact, but the special aim of this edition of Reid. His conviction was, that the philosophy of common sense represents the highest reaches of human speculation, and he sought, accordingly, in his annotations of Reid's writings, as in his independent works, to point out the relation of the Scottish philosophy to the systems of other countries, as well as to translate it into a more scientific expression, that he might bring into clearer view at once its true character and the real basis on which it rests. In this, therefore, more than in any of his other works, he betrays his fondness for eliciting his own theories from the hints of previous thinkers; his peculiar doctrines of perception, of the conditioned, of mental reproduction, etc., are traced to the writings of Aristotle. Valuable, however, as this work is, its latest edition contains references to numerous dissertations beyond that, in the middle of which it abruptly stops. This is undoubtedly to be attributed to the decay of Hamilton's health. By the paralysis of his whole right side, though his mind continued unimpaired, his power of work was seriously curtailed during the later years of his life. He was, however, generally able, with an assistant, to perform the duties of his class till the close of session 1855–56, when his health suddenly became worse, and he died May 6. See his life by prof. Veitch (1869).

The time has scarcely come for estimating the position of Hamilton in the history of philosophy. Though his system professes to be merely an explication of the Scottish philosophy, he seems to be already creating an independent school, and, indeed, it may be questioned whether all his exegetical skill has vindicated the position claimed for Reid, whether, therefore, it would not have been better for Hamilton had he struck into a separate path. For while his philosophy is distinguished in general from previous Scottish speculations by its more rigorously systematic character, it ventures, as in his doctrine of the conditioned, into realms of thought, whose existence had been scarcely surmised by any of his countrymen. This doctrine, which limits positive thought to the conditioned sphere between the contradictory poles of the infinite and the absolute, has attracted more attention than any of his other doctrines, especially since the publication of Mr. Mansel's *Bampton Lectures* in 1858; and though Hamilton's discussion is confined to the metaphysical aspects of the question, and is perhaps incompatible with a consideration of the ethical ideas which must be embraced in our conception of the Infinite Being, it is likely for some time to gather round it the higher efforts of British speculation. Hamilton is also worthy of being distinguished by his important contributions to logic. These may be reduced to the two principles (1) of distinguishing reasoning in the quantity of extension from reasoning in that of comprehension, and (2) of stating explicitly what is thought implicitly; from the former of which issues his twofold determination of major, minor and middle terms, as of major and minor premises; from the latter the quantification of the predicate, the reduction of the modes of conversion to one, and his numerous simplifications in the laws of syllogism.

HAMILTON, Sir WILLIAM, PHILOSOPHY OF, may, within the narrow limits of this article, be most clearly exhibited by a brief outline of his *Lectures on Metaphysics*, given as far as possible in his own language. Philosophy is the study of the nature of things. Its paramount object of consideration is the mind, and, in its stricter meaning, it is

limited to the knowledge of mind and of objects relating to that. It has regard to three points: the facts to be observed; the laws which regulate them; and the true results which are to be drawn from them. There are three great classes of mental facts: those of the cognitive faculties, those of the feelings, and those of the will and desire. The laws which regulate the first constitute logic; those which guide the second are called æsthetics; and those which control the third are known as moral and political science. Among the results to be drawn from these facts are proofs of the being of God and of the immortality of man. Psychology is the science conversant with the facts of the mind. All human knowledge, and, therefore, all philosophy are of the relative or conditioned as opposed to the absolute. This is true of matter, certain qualities of which are known; itself, or, as we commonly say, its substance, is unknown. It is true of mind; certain mental states of knowing, feeling, willing, and desiring are known, but the mind itself is unknown. It is true of existence; certain manifestations of it we know, but of absolute existence we know nothing. Our knowledge of existence is limited by our faculties. Nothing exists *for us* except as it is known to us; and nothing is known to us except certain properties or modes of existence which are analogous to our faculties. Yet, as we are warranted to assert the existence only of what we know, so we are not warranted to deny the existence of what we do not know. The term *mind*, in the rigid employment of it, denotes the self-knowing principle alone. We cannot conceive of mind as existing without consciousness. The term conscious subject is sometimes used as a comprehensive definition of the mind itself or the thinking principle. The great problem of philosophy is to analyze the contents of our cognitions or acts of knowledge; to distinguish what elements are contributed by the mind and what by the object of our knowledge. The general conditions of consciousness are that it is an actual knowledge; is immediate and discriminating; includes judgment; and requires memory. It is co-extensive also with our knowledge. Consciousness is the source of philosophy of mind. The possibility of philosophy implies the veracity of consciousness which as a criterion is naturally clear and unerring. In order to secure the full value of it, three laws for its government must be observed. 1. The law of parsimony. The facts of consciousness adduced must be primary, universal, necessary, and given on the ground of belief only. 2. The law of integrity. The whole facts of consciousness must be taken without hesitation or reserve. 3. The law of harmony. Nothing but the facts of consciousness must be admitted. When all these laws are observed the absolute and universal veracity of consciousness must be maintained. Activity and passivity are always conjoined in manifestations of the mind. The mind is never directly conscious of passivity; is never wholly inactive; and we are never wholly unconscious of its activity. The mind may be unconsciously modified. Our whole knowledge is made up of the unknown and incognizable. There are three principal facts of consciousness: 1. Of self-existence; 2. Of individuality; 3. Of personal identity. There are various cognitive faculties. 1. The presentative, including perception and self-consciousness; 2. The conservative, or memory proper; 3. The reproductive, that is the faculty of recovering the absent thought from unconsciousness; 4. The representative, that is the imagination; 5. The elaborative, that is comparison; consisting of analysis and synthesis, and leading to generalization or conception, to judgment, which is the direct comparison of two things or notions, and to reasoning, which is the comparison of two through a third. This last is thought strictly so called, corresponding to *dianoia*, of the Greek philosophy; *discursus* of the Latin, and *verstand* of the German. Its laws are the object of logic; 6. The regulative faculty, which is reason or common sense. There are cognitions in the mind which are not contingent but necessary, and presupposed by thought as its fundamental condition. They are not derived from experience but are native to the mind, and are the laws by which it is governed. They are similar in character, and are to be collected into a class. To the power possessed by the mind of manifesting these the name regulative faculty is given. It corresponds in some measure with the *nous* of Aristotle's philosophy, with the *vernuft* (reason) in the philosophy of Kant, Jacobi, and other recent Germans; and probably with Reid's, certainly with Stewart's *Common Sense*. Among the uses of philosophy may be specified the fact that it satisfies the conditions of the proof that there is a God. These conditions are: 1. That intelligence is first in the order of existence. 2. That the universe is governed by moral laws. The phenomena of the material world are subjected to immutable laws. The phenomena of man are, in part, subjected to the laws of the external universe. But what he holds of matter do not make up his personality. They are *his* not *he*. He is not an organism, but an intelligence served by organisms. His intelligence reveals principles of action, absolute and universal, in the law of duty. It is only as he is a free intelligence, a moral power, that he is created in the image of God; and it is only as a spark of divinity glows in us, as the life of our life, that we can rationally believe in an intelligent creator and moral governor of the universe. This has been well expressed by Dr. Henry More:

Nullus in microcosmo spiritus
Nullus in macrocosmo Deus.

If there be no moral world there can be, of course, no moral governor; and we have no ground to believe in the reality of a moral world except as we ourselves are moral

agents. If therefore we could be convinced that we are not moral agents, we should also be convinced that there is no moral order and no supreme intelligence by which such order is established and maintained. Philosophers have been, in the main, agreed in holding this view. Plato says of some that "reversing in themselves the relative subordination of mind and body, they also in the universe make matter prior to mind; so that, starting with this error in relation to themselves, they end in the subversion of the Godhead." Kant declares, "Two things fill the mind with ever rising wonder and reverence, the starry heaven *above* and the moral law *within*." And Jacobi affirms that we believe in God not by reason of nature which conceals him, but by reason of the supernatural in man, which alone reveals and proves him to exist. And with this judgment of philosophers revelation accords; for it is a revelation to man and concerning man; and man is only the object of revelation inasmuch as he is a moral, free, and responsible being. In harmony with this view, the Scriptures are replete with testimonies to our natural liberty.

HAMILTON, Sir WILLIAM ROWAN, LL.D., one of the few really great mathematicians of the present c., was b. in Dublin in Aug., 1805. From his infancy he displayed extraordinary talents, having at the age of 13 a good knowledge of thirteen languages. Having at an unusually early age taken to the study of mathematics, in his 15th year he had mastered thoroughly all the ordinary university course, and commenced original investigations of so promising a kind that Dr. Brinkley, himself a very good mathematician, took him under his especial patronage. His earlier essays, connected with contact of curves, and caustics, grew by degrees into an elaborate treatise on the *Theory of Systems of Rays*, published by the royal Irish academy in 1828. To this he added various supplements, in the last of which, published in 1833, he predicted the existence of the two kinds of conical refraction (see REFRACTION), the experimental verification of which by Lloyd still forms one of the most convincing proofs of the truth of the undulatory theory of light. See LIGHT. The great feature of his *Systems of Rays* is the employment of a single function, upon whose differential coefficients (taken on various hypotheses) the whole of any optical problem is made to depend. He seems to have been led by this to his next great work, *A General Method in Dynamics*, published in the *Philosophical Transactions* for 1834. Here, again, the whole of any dynamical problem is made to depend upon a single function and its differential coefficients. This paper produced a profound sensation, especially among continental mathematicians. Jacobi of Königsberg took up the purely mathematical part of Hamilton's method, and considerably extended it; and of late years the dynamical part has been richly commented on and elaborated by several French mathematicians, all uniting in their admiration of the genius displayed in the original papers. For these researches, Hamilton was elected an honorary member of the academy of St. Petersburg, a rare and coveted distinction. The principle of *varying action*, which forms the main feature of the memoirs, is hardly capable, at all events in few words, of popular explanation. Among Hamilton's other works, which are very numerous, we may mention particularly a very general *Theorem in the Separation of Symbols in Finite Differences*, and his *Examination of Abel's Argument concerning the Impossibility of solving the General Equation of the Fifth Degree*.

We may also particularly allude to his memoir on *Algebra as the Science of Pure Time*, one of the first steps to his grand invention of quaternions. The steps by which he was led to this latter investigation, which will certainly, when better known, give him even a greater reputation than conical refraction or varying action has done, will be more properly treated under QUATERNIONS. On the latter subject he published, in 1853, a large volume of *Lectures*, which, as the unaided work of a single man in a few years, has perhaps hardly been surpassed. Another volume of a more elementary character, on the same subject, containing in addition his more recent improvements and extensions of his calculus, was published after his death, which took place Sept. 2, 1865.

While yet an undergraduate of Trinity college, Dublin, he was appointed, in 1827, successor to Dr. Brinkley in the Andrew's chair of astronomy in the university of Dublin, to which is attached the astronomer-royalship of Ireland. In 1835 he was knighted on his delivering the address as secretary to the British association for its Dublin meeting. He occupied for many years the post of president of the royal Irish academy, and was a member of most of the great scientific academies of Europe. He held during his life, not in Dublin alone, but in the world of science, a position as merited as it was distinguished

HAMILTON COLLEGE, in Clinton, Oneida co., N.Y., was first chartered in 1812 and graduated its first class in 1814. Its origin is due to the foresight and generosity of the rev. Samuel Kirkland, a missionary for more than 40 years among the Oneida Indians. He founded the "Hamilton Oneida academy" in 1793, and gave its trustees several hundred acres of land, and from this the college was developed. The college grounds comprise 45 acres, on which are grouped the college buildings, consisting of three four-story brick halls, with rooms mainly for students, a chapel, a library, and memorial hall, a hall of natural history, a chemical laboratory, and an observatory. The library contains 12,000 volumes. The observatory, endowed by Edwin C. Litchfield, and bearing his name, is furnished with an equatorial telescope with an object

glass 13.5 in. in diameter, and a focal length of almost 16 ft., and various other instruments needed for its equipment. The cabinets contain nearly 2000 specimens in geology, mineralogy, and natural history; and there is besides a herbarium with nearly 1000 samples of plants carefully classified. There is a law department, endowed by W. H. Maynard, with a library of 5,000 volumes, the gift of the late William Curtis Noyes, of New York. The triennial catalogue embraces nearly 2000 names. In the library building there is a memorial hall and an art gallery, designed for tablets, portraits, and other memorials of friends of the college. The productive funds of the institution amount to more than $250,000, and the real estate and collections are valued at $300,000. Number of professors, 12; of students, from 150 to 175; president, S. G. Brown, D.D., LL.D.

HAMILTONIAN SYSTEM, a method of teaching languages, so called from the inventor, an English merchant of the name of James Hamilton, b. about 1769. Having removed to Hamburg in 1798, he took lessons in German, on the understanding that he was not to be troubled with the grammar of the language. He and his teacher read together a German book of anecdotes, the pupil translating word for word after his teacher; and after twelve lessons, Hamilton found himself—so at least we are told—able to read an easy German book. His attention was thus drawn to the subject of learning foreign languages; and finding himself, after a life of vicissitudes, in the city of New York, about the year 1815, he wrote a treatise expounding his views, and commenced putting them in practice. He undertook to teach adults in fifteen lessons to translate the Gospel of St. John from French into English, but found, we are told, ten lessons sufficient. After teaching for a time with great success in America, he returned in 1823 to England, and visited the chief cities, everywhere attracting crowds of pupils, notwithstanding that his system was denounced by many as quackery. He died in Dublin in 1831.

The Hamiltonian method was only one stage in the reaction—begun as early as the time of Comenius (q.v.), and carried on, among others, by Milton and Locke—against the pedantic method of beginning to teach a foreign or dead language by making the learner commit to memory a complete set of grammar rules before he had acquired sufficient practical acquaintance with the language itself in its concrete form, to give the rules any meaning. Hamilton's method of procedure may be shortly summed up as follows: Supposing Latin to be the language to be learned, Hamilton put into the pupil's hands the Gospel of St. John in Latin, with an interlinear version, so literal as to show the gender as well as the number of nouns, etc., and the mood, person, and tense of the verbs. The idioms were not translated by corresponding idioms, but each word by its literal equivalent in English. A fundamental point with Hamilton was to give the primitive, and not the derivative signification of the word, and to give the same signification to the same word in whatever connection it might stand. When the pupil had by this practice got a considerable knowledge of the vocables and accidence of the language, he was practiced in turning the English version back into the Latin. Hamilton undertook in this way to give boys of eleven as much knowledge of Latin in six months as they usually learn at our public schools in six years. One obvious defect of this method is, that no language admits of a word-for-word and uniform translation into another; the method is in this respect misleading. Besides, one great use of learning languages is as a mental discipline, and in this point of view the Hamiltonian system is useless. It may be useful in the case of adults who wish to acquire, with as little labor as possible, a limited power of reading and speaking a language; and in any case, a language once begun to be learned on Hamilton's principles, may be afterwards prosecuted on a better method, thus avoiding the painful initiatory stages of the grammatical method. The necessity, however, of having recourse to the crude method of Hamilton, is superseded in the practice of most modern teachers, who contrive to make the practical and grammatical knowledge of a language go hand in hand.

HAMIRPUR, or HUMEERPOOR, a British district in India in the n.w. provinces, forming the s.w. district of the Allahabad division, bounded on the n. by the Jumna; on the n.w. by the native state of Baoni and Betwa river; on the w. by the Dhasan river; on the s. by Alipura, Chhatarpur, and Charkhari states; and on the e. by the Banda district. It incloses the native states of Sarila, Jagni, and Bihat, besides portions of Charkhari and Garrauli. Pop. '72, 529,137. Hamirpur forms part of the great plain of Bundelkhand, which stretches between the banks of the Jumna and the central Vindhyan plateau. The district is in the shape of an irregular parallelogram, with a general slope northward from the low hills on the southern boundary. The scenery is rendered picturesque by the artificial lakes of Mahoba. These magnificent reservoirs were constructed by the Chandel rajas about 800 years ago, for the purpose of irrigation and as sheets of ornamental water. Many of them inclose craggy islets or peninsulas, crowned by ruins of granite temples, exquisitely carved and decorated. From the base of this hill and lake country the general plain of the district spreads northward in an arid and treeless level towards the broken banks of the rivers. Of these the principal are the Betwa and its tributary the Dhasan, both of which are unnavigable. There is little waste land, except in the ravines by the river sides. The deep black soil of

Bundelkhand, known as mar, retains the moisture under a dried and rifted surface, and renders the district fertile.

HAMLET. See AMLETH, *ante*.

HAMLIN, a co. in e. Dakotah formed after 1870; traversed by Big Sioux river; 720 sq. miles. It is mostly level and bare of timber.

HAMLIN, CYRUS, D.D., LL.D., b. at Waterford, Me., 1811; graduated at Bowdoin college 1834, and at Bangor theological seminary 1837. In 1838 he went to Constantinople, Turkey, as a missionary under the direction of the American board; and, in this capacity, established the seminary at Bebek in 1840. Having in 1860 resigned his relation to the board, he spent 13 years in establishing and presiding over Robert college, an institution in Constantinople named after its founder, Christopher R. Robert of New York city. While on a visit to the United States engaged in promoting the interests of the college, he accepted the chair of theology in Bangor seminary, to which, in 1877, he was called. In 1880 he was elected president of Middlebury college, Vt., and now holds the office. Bowdoin college and Harvard university have conferred on him the degree of D.D.; and the same college and the university of New York that of LL.D.

HAMLIN, HANNIBAL, b. Me., 1809; commenced life as a printer, but studying law was admitted to the bar in 1833; was democratic representative in congress 1843–47, but in 1856 withdrew from his party and in the republican interest accepted the governorship of Maine. In 1860 he was vice-president of the United States; and for a time occupied the position of collector to the port of Boston. In 1869 he was once more elected U. S. senator.

HAMLINE, LEONIDAS LENT, 1797–1865; b. Conn.; studied for the Presbyterian ministry, but afterwards studied law and practiced in Ohio. In 1830, however, he became a preacher in the Methodist church, and in 1840 was chosen assistant editor of the *Western Christian Advocate* and chief editor of the *Ladies' Repository*. In 1844, when the Methodist church divided n. and s. on slavery, he was a member of the general conference, and drew up the plan of separation. He was elected bishop at that session, and served until 1852. His writings are devoted chiefly to the illustration and defense of the Wesleyan doctrine of sanctification.

HAMM, a t. of Prussia, in the province of Westphalia, is situated on the left bank of the Lippe, 22 m. n.n.w. of Arnsberg. It is surrounded by an old wall now converted into a promenade, and by a ditch; contains a castle, gymnasium, and college, and carries on the manufacture of linen extensively. Iron is also produced. Hamm was formerly one of the Hanse towns. Pop. '75, 18,904.

HAMME, a t. in East Flanders, Belgium, on the right bank of the Durme, near its junction with the Scheldt, 18 m. e.n.e. of Ghent. It contains grain and oil-mills, has manufactures of lace, ribbons, linen, starch, ropes, and cordage, and carries on trade in flax. Pop. '76, 10,778.

HAMMER-PURGSTALL, JOSEPH VON, Baron, 1774–1856; b. Austria; was named von Hammer, and adopted the name by which he is known, on receiving a legacy comprising the estates in Styria, of the countess of Purgstall. Having studied the oriental languages in Vienna, and displaying a surprising facility in their acquirement, he was appointed interpreter to the internuncio at the Porte in 1799, and continued in the Austrian diplomatic service until 1817, when he was made aulic counselor. In 1847–49 he was president of the academy of Vienna. Meanwhile he wrote constantly on all subjects bearing relation to the east and in most of the European languages. He translated from the Arabic, Persian, and Turkish, works hitherto unknown in Europe. He also wrote concerning the eastern races, their antiquities, philology, music, literature, etc. One of his most important works was the *Literaturgeschichte der Araber*. He also wrote the *Geschichte der Assassinen* and *Geschichte der Osmanischen Dichtkunst*. At the period of his death, at 82 years of age, this remarkable man retained his buoyancy of mind, and he pursued his industrious habits to the last.

HAMMER-BEAM, a portion of an open timber roof, forming a truss at the foot of the rafter, which gives strength and elegance to the construction. It looks as if there had been a tie right across, and the center part being cut out, the remnants at each end form the hammer-beam. The end next the apartment is usually ornamented with shields, heads, pendants, etc.

HAMMER-CLOTH, a cloth which covers the driver's seat in some kinds of gentlemen's carriages. The term is believed to be a corruption of hammock-cloth, the seat which the cloth covers being formed of straps or webbing stretched between two crutches, as a sailor's hammock is suspended. Ease of motion, as in the case of springs, is the cause of this arrangement. Hammer-cloths are usually ornamented with fringes, and bear the arms of the proprietor of the carriage. They are old-fashioned, and now more seldom seen than formerly.

HAM'MERFEST, the principal t. and trading port of Finmark (q.v.), in Norway, and the most northern town of Europe, is situated in 70° 40′ n. lat., and 23° 30′ e. long. Pop. about 2000. Hammerfest is situated in a barren treeless district, in the rocky island of Kvaloe ("Whale island"), and consists of one long street skirting a wall of

rock. The harbor is good, and presents a busy appearance during summer, when it is visited by some 200 vessels, which bring hemp, meal, potatoes, and other provisions, in exchange for oil and fish (the staple commodities of the island), reindeer hides, eider-down, and fox-skins. During the two summer months the sun is continually above the horizon, and the heat is very great, yet the winter, singular to say, is mild enough to allow of the fisheries being carried on. Copper from the works at Kaafiord, which have been in the hands of an English company since 1847, is also sent to England from Hammerfest. Hammerfest is the northern limit of the birch.

HAMMER-HEAD, or HAMMER-HEADED SHARK, *Zygæna* or *Sphyrna*, a genus of fishes of the great family of sharks; having the general form and characters of the family, but distinguished from all other fishes by the extraordinary form of the head, which, in the adults, resembles a double-headed hammer, being extended on both sides to a considerable length, and having the eyes at the ends of the lateral extensions. The mouth is below the center of the head. The hammer-headed form is not nearly so perfect in the young as in the adults. It is supposed to be intended for enlargement of the sphere of vision. In the fœtal state, the lateral extensions are doubled upon themselves. The hammer-heads are ovo-vivi-parous, and produce many (about forty) young at a birth. They are most abundant in tropical seas. In the bight of Benin, "they may often be seen ascending from the clear blue depths of the ocean like a great cloud." They are very voracious. Some of them attain a great size. One species (*Z. malleus*) has been taken on the British coasts. It attains a length of 12 ft. or upwards. It chiefly belongs to the warmer parts of the Atlantic ocean.

HAMMERSMITH, a village of England, in the co. of Middlesex, about 6 m. w.s.w. of the London post-office, is situated on the Thames, which is here crossed by an elegant suspension bridge, completed in 1827, at a cost of £80,000. The grounds in the vicinity are occupied as nurseries and market-gardens, from which a large supply of flowers and vegetables is sent to the city. The parish church, a plain brick building with a low tower, was erected in 1631, and consecrated by Laud, then bishop of London. Hammersmith contains also the convent of the Good Shepherd, and, in connection with it, an asylum for penitent women. Near the Broadway stands the west London hospital, supported by voluntary contributions. There is also a large endowed school, founded by a Mr. William Godolphin, and which takes his name. The premises and grounds of the school-room cover upwards of 4 acres. Formerly, a detached village, and connected with London only in a commercial sense, Hammersmith is now joined to that city by continuous lines of street, and forms essentially a portion of it. The parish of Hammersmith is traversed by 6 very important railways, two of which terminate here. Pop. of the parish in '71, 42,691.

HAMMER, STEAM-HAMMER, a tool used for applying the force of impact, either for the purpose of beating malleable materials into a required form, or for driving nails, wedges, etc. The common hand-hammer consists of an iron head, usually faced with steel, fixed crosswise upon a wooden handle. When one side of the head is thinned out of a wedge form or to a point, this is called the *pane* of the hammer. The *face* is the flat disk which strikes the work. Carpenters' and joiners' hammers have a bent pane with a V-shaped notch, which is used as a bent lever for drawing nails, etc. The pane is sometimes sharpened so as to form an adze or chisel. A multitude of other modifications in the form of hammers are made to suit different kinds of work. Some of the more important of these are treated under the heads of the various operations, such as FORGING, FILE-CUTTING, GOLD-BEATING, etc.

For many purposes, hammers are required of greater weight than a man can wield; and a great variety of power-hammers are used. These, for the most part, are masses of iron raised by steam or other power, and then allowed to fall by their own gravity upon the work. The *helve* or *shingling hammer*, used for compressing the mass of iron drawn from the puddling furnace, and the *tilt-hammer*, used in the manufacturing of shear-steel, are important examples of such hammers. The first is a heavy bar of cast iron about 10 ft. long, weighing 3 or 4 tons and upwards, to which is attached a head of wrought iron faced with steel, weighing nearly half a ton more. It works upon an axis at the end of the bar furthest from the head, and is raised by cams attached to a heavy wheel set in motion by steam or water-power; these cams strike or "lick" a projection extending beyond the head, and thus raise it about 18 or 20 in. at the rate of from 70 to 100 times per minute. The tilt-hammer is similar, but much lighter, and is adapted for striking above 300 blows per minute. In order to obtain this velocity, a short "tail" extends with a downward inclination beyond the axis, and the cams strike this downwards, and thus lift the longer arm of the lever to which the head is attached. These, when worked by steam, as they usually are in this country, are, of course, steam-hammers; but when the term steam-hammer is used without qualification, it applies to another and more elaborate machine of very different construction, invented by Mr. James Nasmyth in 1842, and subsequently modified and improved in some of its minor details. In this, the hammer is attached to the bottom of a heavy mass of iron, the "hammer-block," capable of rising and falling between upright bars or "guides;" this, again, is fixed to the rod of a piston, which works in a cylinder placed perpendicularly over the hammer-block, hammer, and anvil. As the piston rises in the

cylinder, it lifts the attached mass, which is then allowed to fall from varying heights, according to an adjustment which can be made by an attendant simply touching a handle. The adjustments are so perfect that it may be made to crush a mass of iron, and at the next blow to crack a nut held in the fingers without damaging either kernel or fingers, or to crack the top of an egg in an egg-cup, as might be done with the bowl of a spoon. The mechanism by which this is effected is too elaborate to be described here in detail. One novel contrivance, viz., the "latch," which reverses the action of the steam-valves at the precise moment required, is of remarkable ingenuity.

In the first "Nasmyths" that were used, the weight of the descending mass—viz., the hammer-block, hammer, etc.—was from 30 to 60 cwts., and they were justly regarded as mechanical marvels. Steam-hammers with a descending mass of 20 to 50 tons have since been constructed. In order to compare the power of these with the "helve" or other hammers, which descend by angular motion on a pivot, it must be remembered that these latter, when formed of a straight bar, are only effective to the extent of a body of one-third of their weight falling directly from a corresponding height, on account of the fact that the whole bar forming the hammer is moving with a velocity varying from nothing at the axis, to a maximum at the end of the bar, where the hammer-face is fixed.

HAMMOCK, the apparatus in which a sailor slings his bed, derives its name through the Spanish *hamac*, from a Peruvian word; the custom of thus suspending a bed having been derived from Peru, where the natives fasten the two ends of a piece of canvas, or of a netting of grass twist, to the branches of a tree, and lie suspended on it in luxurious ease. A sailor's hammock consists of a rectangular piece of hempen cloth, about 6 ft. long and 3 in width, gathered together at each end by means of cords and a clew, and hung to hooks under the deck. The hammock thus suspended forms a sort of bag capable of containing the sailor's mattress, his blankets, and himself, as soon as he has acquired the far from easy knack of climbing into it. The hammocks are taken below at sunset, and hung in rows about 2 ft. apart, in the men's portion of the ship. When done with in the morning, the bedding is carefully tied up within each, and the whole stowed in the hammock-netting, which is generally in the bulwarks of the waist. If the weather be not sufficiently dry, however, to allow of this, the hammocks are left below. Stowed thus in the netting, the hammocks form a strong barrier against small shot.

HAMMOND, EDWARD PAYSON, b. Conn., about 1835; an evangelist, graduated at Williams college in 1858, studied at the Union theological seminary in New York, and going to Ireland in 1859, became conspicuously active in the religious revival then in progress at Ballymena, near Belfast. He continued his studies at the university of Glasgow, where he graduated in theology in 1861, having meanwhile become widely distinguished for evangelistic work in Scotland, England, and Wales. Returning to America in 1861 he carried on a revival work with great success in Portland, Me.; and since then has been widely known in evangelistic work in all parts of the United States and Canada. He has a residence in his native town, Vernon, Conn., to which he retires in the seasons of rest from revival work. He has at different times traveled widely in Europe and Palestine, and is the author of some books for children, and the compiler of hymn books used in his meetings.

HAMMOND, HENRY, D.D., a learned English divine and able controversial writer, the youngest son of Dr. John Hammond, a physician, was b. at Chertsey, Surrey, Aug. 18, 1605. Educated at Eton, he was, in 1618, sent to Magdalen college, Oxford, where he sedulously applied himself to classical studies. In July, 1625, he became a fellow of his college, and in 1629 entered into holy orders. In 1633 he was presented to the rectory of Penshurst, in Kent, and in 1643 he became archdeacon of Chichester. Hammond followed the unfortunate Charles to the isle of Wight, and continued with the king as his chaplain till his attendants were dismissed, in 1647; he then returned to Oxford, and was chosen sub-dean of Christchurch. In 1648 he was deprived of his college offices by the parliamentary commissioners, and shortly after retired to Westwood, in Worcestershire, the seat of sir John Packwood, where the remainder of his life was spent in literary labor. He died April 25, 1660. His celebrated work, the *Paraphrase and Annotations on the New Testament*, was published in 1653. A new and enlarged edition came out in 1656, but the best edition is that of 1702. His collected works were published, in 4 vols. folio, in 1674–84. His sermons and minor works are reprinted in the Oxford *Library of Anglo-Catholic Theology*.

HAMMOND, JAMES HAMILTON, 1807–64; b. S. C.; graduated from South Carolina college, was admitted to the bar, and in 1830 was the editor of the *Southern Times*, published at Columbia. He was an advocate of nullification. In 1835 he was in congress, and in 1842 was governor of South Carolina. He wrote on the side of slavery in answer to Thomas Clarkson's attacks, *The Pro-Slavery Argument*, and also many essays on agriculture, finance, etc. He was U. S. senator in 1857, and the next year proclaimed in his speeches that northern laborers were "the mudsills of society," and that "cotton is king, and no power on earth dare make war upon it." Naturally he went with his state in the rebellion, and left his place in the senate.

HAMMOND, SAMUEL, 1757–1842; b. Va.; while a boy he served in wars against the Indians, and in 1779 raised a company in support of the revolution. He was in the fight at Stono Ferry and in other engagements in the south. In 1793 he led a regiment against the Creek Indians in Georgia. In 1805 he was military commander of upper Louisiana; in 1831 secretary of the state of South Carolina.

HAMMOND, WILLIAM ALEXANDER, b. Md., 1828; graduated in medicine at the New York university in 1848; the next two years was assistant surgeon in the regular army; and in 1860 professor of physiology and anatomy in Maryland university. In 1861 he re-entered the military service as assistant surgeon, and in 1862 was appointed surgeon-general. In 1864 he became professor of mental and nervous diseases and of clinical medicine in Bellevue hospital medical college, New York, and physician-in-chief for diseases of the nervous system in New York state hospital. Dr. Hammond has published a number of valuable works, among which are *A Treatise on Hygeine, with special reference to Military Science; Physiological Memoirs; Lectures on Venereal Diseases; On Wakefulness with introductory chapter on Sleep; Insanity in its Medico-legal Relations; Sleep and its Derangements; Physics and Physiology of Spiritualism; Treatise on Diseases of the Nervous System; Insanity in its Relations to Crime*, etc., besides editing *Medical and Surgical Essays*, and translating Meyer's *Electricity in its Relations to Practical Medicine*.

HAMON, JEAN LOUIS, 1821–74; a French painter. At an early age he was destined to the priesthood, but his strong desire to become a painter finally triumphed over family opposition, and in 1840 he repaired to Paris. Here he received valuable counsel and encouragement from Delaroche and Gleyre, and in 1848 he made his appearance at the *salon* with "Le tombeau du Christ," and a decorative work, "Dessus de Porte." His paintings, up to 1849, had attracted little public notice, and he was content to accept a place in the manufactory of Sevres, but an enameled casket by his hand having attracted attention at the London international exhibition of 1851, he received a medal, and, re-inspired by success, left his post to try his chances again at the *salon* of 1852. "Le Comédie Humaine," which he then exhibited, turned the tide of his fortune, and "Ma soeur n' y est pas" (purchased by the emperor) obtained for the artist a third-class medal. At the Paris international exhibition of 1855, when Hamon re-exhibited the casket of 1851, together with several vases and pictures, of which "L'Amour et son Troupeau," "Ce n' est pas moi," and "Une Gardeuse d' Enfants," were the chief, he received a gold medal of the second class, and the ribbon of the legion of honor. In the following year he was absent in the east, but in 1857 he reappeared with "Boutique à quatre Sous," "Papillon enchainé," "Cantharide esclave," "Dévideuses," etc., in all, ten pictures; "L'Amour en visite" was contributed to the *salon* of 1859, and "Vierge de Lesbos," "Tutelle," "La Volière," "L'Escamoteur," and "La Souer ainée," were all seen in 1861. Hamon now spent some time in Italy, chiefly at Capri, whence in 1864 he sent to Paris "L'Aurore Un Jour de Fiançailles." The influence of Italy was also evident in "Les Muses à Pompéi," his sole contribution to the *salon* of 1866, a work which enjoyed great popularity and was re-exhibited at the international exhibition of 1867; together with "La Promenade," and six other pictures of previous years. His last work, "Le triste Rivage," appeared at the *salon* of 1873. It was painted at St. Raphael, where Hamon had finally settled in a little house on the shores of the Mediterranean, close by Alphonse Karr's famous garden. Hamon was remarkable for delicacy of coloring, as well as for effective grouping and general composition.

HAMOON'. See SEISTAN, LAKE OF.

HAMPDEN, a co. in w. central Massachusetts, on the Connecticut, Westfield, Chicopee, and Swift rivers, crossed by the New Haven and Northampton, the New London, Northern, and the Connecticut River railroads; 620 sq.m.; pop.'80, 104,117. The surface is diversified with hills and valleys. There is plenty of timber, and water power is abundant. The chief productions are corn, tobacco, hay, and butter. Co. seat, Springfield.

HAMPDEN, JOHN, a celebrated English patriot, said to have been born in London in 1594, was the son of William Hampden of Hampden, Buckinghamshire, and Elizabeth, daughter of sir Henry Cromwell of Hinchingbrooke, Huntingdonshire, aunt of Oliver Cromwell. His father died in 1597, when he was only three years old. In 1609 he was entered a gentleman commoner at Magdalen college, Oxford, and in 1613 was admitted to the Inner Temple, where he made considerable progress in the study of law. On Jan. 30, 1621, he first entered the house of commons as member for the now disfranchised borough of Grampound. He attached himself to the party of St. John, Selden, Coke, Pym, and those who opposed the arbitrary encroachments of the crown, but at first took no very forward part in public business, and spoke but seldom. In the first three parliaments of Charles I., he sat for Wendover. In 1627, for refusing to pay his proportion of the general loan which the king attempted to raise on his own authority, Hampden was committed to close imprisonment in the Gatehouse. Subsequently, he was removed to Hampshire, but, with seventy-six others, unconditionally liberated by an order of council. His activity and industry in parliament now rendered him one of its leading and most useful members; he was on most of its committees; but after the

dissolution of the parliament of 1628–29, he retired to his estate, and devoted himself to study and to country sports and occupations. Claiming the power to tax the country in any way he thought proper, in 1634, Charles had recourse to the impost of ship-money. At first, limited to London and the maritime towns, and levied only in time of war, it was, in 1636, extended to inland places in time of peace, when Hampden resolutely refused to pay it, and his example was followed by nearly the whole county of Buckingham. In 1637 he was prosecuted before the court of exchequer for non-payment, when a majority of the judges gave a verdict against him. In the short parliament of 1640 Hampden took a prominent part in the great contest between the crown and the house of commons. To the long parliament he was returned both for Wendover and the county of Buckingham, and made his election for the latter. For his resistance to the king's proceedings, he was one of the five members whom Charles, on Jan. 4, 1642, rashly attempted in person to seize in the house of commons; and on the breaking out of the civil war, he raised and became col. of a regiment in the parliamentary army under the earl of Essex. He was also a member of the committee of public safety, and in the prosecution of the war, constantly advised prompt and energetic measures. He was present at the repulse of the royalists at Southam, at their defeat near Aylesbury, at the fight at Edgehill, and at the assault and capture of Reading. Prince Rupert having attacked a parliamentary force at Chinnor, near Thame, Hampden put himself at the head of a few cavalry that were rallied in haste to oppose him, and in the fight that ensued at Chalgrove Field, received in the first charge a wound of which he died six days after, on June 24, 1643. He was twice married, and by his first wife had three sons and six daughters.

HAMPDEN, RENN DICKSON, D.D., 1793–1868; bishop of Hereford; b. Barbadoes; educated at Oxford. Having left the university in 1816, he held successively the curacies of of Newton, Faringdon, and Hackney, and in 1827 he published *An Essay on the Philosopical Evidence of Christianity*, followed by a volume of *Parochial Sermons illustrative of the importance of the Revelation of God in Jesus Christ.* In 1828 he returned to Oxford as tutor of Oriel, and after having twice acted as public examiner in classics, he was selected to preach the Bampton lectures in 1832, when he chose for his subject *The Scholastic Philosophy considered in its Relation to Christianity.* Notwithstanding a charge of Arianism, he became principal of St. Mary's hall, and professor of political economy, and in 1836 regius professor of divinity. There resulted a widespread and violent though ephemeral controversy, after the subsidence of which he published a *Lecture on Tradition*, which has passed through several editions, and a volume on *The Thirty-nine Articles of the Church of England.* His nomination by lord John Russell to the vacant see of Hereford in Dec., 1847, was again the signal for a violent and organized opposition; and his consecration in March, 1848, took place in spite of a remonstrance by many of the bishops and the resistance of Dr. Merewether, the dean of Hereford, who went so far as to vote against the election when the *conge d' elire* reached the cathedral. Among the more important of his later writings were the articles on Aristotle, Plato, and Socrates, contributed to the eighth edition of the *Encyclopædia Britannica*, and afterwards reprinted with additions under the title of *The Fathers of the Greek Philosophy* (Edinburgh).

HAMPDEN-SIDNEY COLLEGE, in Prince Edward co., Va., founded in 1775. Among the early trustees were Patrick Henry and James Madison. Rev. Samuel Stanhope Smith was the first president, succeeded by rev. John Blair Smith, rev. Archibald Alexander, and rev. Moses Hoge. At present J. M. P. Anderson, D.D., is the presiding officer. There is no preparatory school, nor any professional school. Diplomas are awarded only to students who have passed through the full course prescribed.

HAMPSHIRE, a co. in w. central Massachusetts, intersected by the Connecticut, Chicopee, Westfield, and Swift rivers, and by the New Haven and Northampton, the New London Northern, and the Connecticut river railroads; 600 sq.m.; pop. '80, 47,235. The surface is hilly and the soil fertile; chief productions: corn, hay, tobacco, etc. There are many manufacturing establishments. Co. seat, Northampton.

HAMPSHIRE, a co. in e. West Virginia, s. of the Potomac, intersected by the Cacapon river and reached by the Baltimore and Ohio railroad; 640 sq.m.; pop. '70, 7,643—640 colored. The surface is rough and to a large extent covered with forests. Corn, wheat, and hay are the main products. Iron is found. Co. seat, Romney.

HAMP'SHIRE, SOUTHAMP'TON, or familiarly HANTS, a maritime co. in the s. of England, is bounded on the w. by Dorset and Wilts, on the n. by Berks, on the e. by Surrey and Sussex, and on the s. by the English channel. The county, including the isle of Wight, has an area of 1,070,216 acres, 900,000 of which are estimated to be under culture. Its pop. in '61 was 481,495; and in '71, 544,684. The surface is irregular, being traversed by the North and South Downs. The s.w. portion of the county, almost wholly detached from the main portion by the Southampton water, is occupied mainly by the New Forest. This tract is 64,000 acres in extent, is the property of the crown, and is valuable for the oak and beech timber obtained from it for the use of the British navy. Within the forest, an aboriginal breed of pony is still found. Besides that called the New Forest, there are also remains of those of Bére, Alice Holt, Wool-

mer, etc. The principal rivers are the Anton or the Test, and the Itchen, which flow southward through the county into the Southampton water, and the Avon, also flowing southward, and forming the western boundary of the New Forest. The climate of the county is in general mild, and favorable to vegetation; indeed, the climate in the s. of the isle of Wight is supposed to be milder than that of any other portion of Great Britain. The soil consists in part of poor sands and gravel, and of a mixture of stiff clay and chalk. All the usual crops are produced, hops are cultivated, and the bacon cured here is famous. The manufactures of the county are inconsiderable. Southampton and Portsmouth, both termini of important railways, are the chief centers of trade. The county, exclusive of the boroughs and the isle of Wight, sends four members to the house of commons. The New Forest seems to have been fatal to the family of William the conqueror; there two of his sons, and his grandson, met with sudden and violent deaths. Of the early ages of English history, Hampshire contains many interesting relics: of these the chief are Porchester castle, at the head of Portsmouth harbor; Calshot and Hurst castles, now occupied as coast-guard stations, erected in the time of Henry VIII., and Netley and Beaulieu abbeys, and the priory of St. Dionysius, all in the neighborhood of Southampton. The county is exceedingly rich in Roman remains, as coins, urns, pottery, etc. For further information on the antiquities and history of the towns of Hampshire, see articles WIGHT, ISLE OF; WINCHESTER, etc.

HAMPSTEAD, a village of England, in the co. of Middlesex, is finely situated on a range of hills 4 m. n.n.w. of London. It was formerly famous for its medicinal springs, and is still a favorite place of residence and of holiday resort among Londoners, who are attracted to it by the beauty of its situation and the purity of its air. On the summit of the hill, above the village, is the Heath, which affords extensive and pleasant prospects of the surrounding country. On the Hampstead road, and in the vicinity of the village, many handsome villas have been erected. Pop. '71, 32,281. A house on the Heath, formerly called the Upper Flask inn, and now a private residence, was at one time a place of resort of the famous Kit-Kat club, at which Steele, Addison, Richardson, and others used to assemble. The village of Hampstead was much frequented by Pope, Gay, Johnson, and Akenside, and later by Byron, Leigh Hunt, and Johanna Baillie.

HAMPTON, a t. in Rockingham co., N. H., on the Eastern railroad, 47 m. n.e. of Boston; pop. 1177. The place was settled in 1638 near a block-house which was put up two years before to mark the n.e. boundary of Massachusetts. The settlers, chiefly from Norfolk, England, were long subjected to Indian troubles. It is now a thriving and handsome village. Three m. to the s.e., on the ocean, is Hampton beach, a watering-place of wide repute. Here is Boar's Head, a cliff 70 ft. above tide, affording magnificent marine views. On the s. are all kinds of large and small beaches all the way to cape Ann. Mt. Agamenticus is seen to the n. beyond the village of Rye, and the isles of Shoals are off-shore to the n.e. The beach at Hampton affords excellent facilities for bathing, promenade, and driving.

HAMPTON, a small village on the Chesapeake bay, in Virginia, U. S., giving its name to Hampton roads, a southerly branch of Chesapeake bay, and mouth of James river, one of the best harbors on the American coast, defended by fortress Monroe and fort Calhoun. These roads were the scene of important events in the American revolution, the war of 1812, and the civil war of secession, especially of the first naval battle between iron-clad vessels, the *Virginia* or *Merrimac* and the *Monitor*. Pop. '70, 2,300.

HAMPTON, a village of England, in the co. of Middlesex, is pleasantly situated on the left bank of the Thames, about 12 m. s.w. of London. The streets are narrow, and the houses irregularly built; in the vicinity, however, there are many noble mansions and beautiful villas. Pop. 71, 2,207.

HAMPTON COURT PALACE, long a royal residence, and now usually occupied by persons of rank reduced in circumstances, stands about a mile from the village in the midst of grounds that extend to the Thames. The original palace was erected by cardinal Wolsey, and came afterwards into the possession of Henry VIII., who enlarged it, and formed around it a royal park or chase, which he stocked with deer. Here Edward VI. was born, and here his mother, queen Jane Seymour, died. Charles I. underwent a portion of his confinement at this palace, and it was the occasional residence of Cromwell, Charles II., and James II. A considerable portion of it was rebuilt by William III., and by him the park and gardens were laid out in the formal Dutch style. The palace, as it at present stands, consists of three quadrangles with some smaller courts; the great eastern and southern fronts having been erected by Sir Christopher Wren. The picture-gallery comprises Lelly's "Beauties of the Court of Charles II.," valuable specimens of Holbein, Kneller, West, etc., and above all, seven unequaled cartoons by Raphael. The gardens, which are about 44 acres in extent, and have not been materially altered since they were laid out by William III., present a series of curious raised terraces, formal flower-plots, and long shady and trim arcades. Among other attractions of the gardens is a "maze" or labyrinth, which furnishes much amusement to youthful visitors.

HAMPTON, WADE, 1754–1835; b. S. C. He was a bold and distinguished partisan under Marion and Sumter in the war of the revolution. In 1795 he was in congress, and was re-elected in 1802. In the war with Great Britain (1812–15) he was a maj.gen. He was very obnoxious to other officers, because of his overbearing disposition. At one time he was the owner of 3,000 slaves.

HAMPTON, WADE, b. S. C., 1818. He is the grandson of the great slaveholder, and inherits much of the father's rashness. Graduated at the state university he became a lawyer, and was at an early age in the legislature. In the war of the rebellion he was one of the confederate leaders in command of the Hampton legion (cavalry), and was wounded at Bull Run. Rising to the rank of brig.gen. he was in the battle of Seven Pines, and again wounded. Still another wound was received at the battle of Gettysburg. In 1864 he was made lieut.gen., and in 1865 he was in command of the rear-guard at Columbia, S. C., when a great part of that city was destroyed by fire. In 1877 he became governor of South Carolina, after a long dispute whether he or gov. D. H. Chamberlain was rightfully entitled to that office. He was chosen again governor in 1878, and the same year was elected to the U. S. senate to serve six years, from Mar. 4, 1879.

HAMPTON COURT CONFERENCE, a conference which took place at Hampton court, shortly after the accession of James I. to the throne of England, in order to the settlement of ecclesiastical disputes. The king presided and took a principal part in the conference. He was attended by some of the nobility and highest officers of state, but no one seems to have been permitted to take any part in the proceedings except the king himself and the divines whom he had summoned. Of these, the representatives of the Episcopalian party were more numerous than the Puritans; and the Puritans, although men of known worth and learning, were among the least extreme of their party. Archbishop Whitgift, with eight bishops, six deans, and an archdeacon, appeared on the Episcopalian side; two Oxford professors of divinity, two divines from Cambridge, and along with them Mr. Patrick Galloway, minister of Perth, in Scotland, maintained the Puritan cause. On the king's accession, the Puritans, entertaining great hopes of release from the rigid enforcement of ceremonies which galled their consciences, and of the reformation of abuses in the church, had addressed a petition to the king, known as the *Millenary Petition*, because it was signed by nearly 1000 ministers in all parts of the country. But the king's intention was not to comply with their wishes, and the Hampton court conference seems to have been merely a device for making it appear that their demands had been considered and found unreasonable. On the first day of the conference, Jan. 12, 1604, the Episcopalians alone were admitted to the presence of the king, who demanded their opinion, which they gave, on the third day after, in favor of the existing system in all the parts complained of. The king debated with them on some points; and in the end, decided against them in a few minor particulars, thus maintaining the assertion of his own ecclesiastical supremacy, as well as finding an opportunity for the display of his attainments in theology, although in all that was most important, his verdict was in their favor. On Jan. 16, the Puritans were called to the king's presence, but along with them some of the Episcopalians, when James debated keenly against the Puritans, using language very unworthy of a king or of a Christian, and according to his own account of the matter, "peppered them soundly." On Jan. 18, both parties were called in, and the royal judgment intimated, which was afterwards announced in a proclamation very adverse to the Puritans.

HAMPTON NORMAL AND AGRICULTURAL INSTITUTE, for the instruction of negro and Indian pupils, stands on the e. shore of Hampton creek, a little below the town of Hampton, Va., 2½ m. from fortress Monroe, on an estate of 190 acres, once known as "Little Scotland." It owes its existence to the American missionary association, which purchased this estate in 1867 and opened a school on the manual labor basis in 1868. The labor of its organization was largely devolved on its enthusiastic and indefatigable principal, Samuel C. Armstrong, who early succeeded in gathering an unusually zealous and efficient company of teachers and helpers. The place was selected for its natural beauty and healthiness, as well as for its accessibility, and partly also because it is surrounded by a numerous colored population. In 1870 the institution received a charter from the state of Virginia, and it is now controlled by a board of trustees, with power to choose their successors, the property having been transferred to them upon condition that the religious teaching of the school shall be evangelical. It is neither a college nor a university, but a school adapted to the immediate needs of the colored population of the southern states, the managers, of course, having power at any time to enlarge its scope as circumstances may require. It has invested funds amounting to $79,814. Its income from all sources, including the interest of the state agricultural land fund ($10,000), interest of invested funds ($2,500), and voluntary contributions, is from $30,000 to $35,000 annually. Several of its buildings were burned in Nov., 1879, and are not yet wholly replaced, but will be ere long. The principal structures are academic hall, of brick, 110 by 70 ft., in the form of a Greek cross, used for school and recitation rooms, and boys' sleeping-rooms; Virginia hall, of brick, 192 by 40 ft., with central wing extending 100 ft. in the rear, used for girls' and teachers' rooms, and containing also a large chapel, students' dining-hall, laundries, kitchens, printing-office,

knitting-room, etc. The smaller buildings are two cottages for boys' rooms, wigwam for the use of Indian students, dwelling-houses for managers and teachers, barns and out-houses, ice-house, saw-mill, engine-house, and the Butler school-house. The institute also owns a farm of 339 acres, called "Shellbanks," on Back river, 7 m. from the school. This farm—the gift of a friend—is used for keeping and raising stock, and, in summer, for an Indian camp, and the labor upon it is mainly performed by the students, the institution being founded on the manual labor plan. The laboratories and apparatus were destroyed by fire in 1879, and have been only partially replaced. The museum, with its collections, and the library also, have been greatly injured by fire. The latter contains 600 volumes, and embraces a reading-room, where from 50 to 80 periodicals and newspapers are kept on file for the use of the students. A monthly periodical, *The Southern Workman*, devoted to the industrial classes of the south, is printed on the grounds, affording occupation for some of the students and an admirable vehicle for advertising the advantages of the school. The departments of instruction are two, academic and industrial, the former embracing a three years' course of English branches, including mathematics through algebra, with intellectual philosophy, civil government, political economy, book-keeping, history, English literature and composition, natural philosophy, chemistry, and practice in teaching. In the industrial department instruction is given in farming and in the following mechanical branches: carpentry, shoemaking, blacksmithing, tailoring, iron and tin-work, housework, cooking, and sewing and knitting by machine. The school has a military organization, as required by the act of congress appropriating the land-fund; an officer of the army being detailed by the government to give instruction. Calisthenic exercises are taught in the senior class to boys and girls alike, both sexes being admitted to the school on equal terms. Pupils on entering are only required to have a knowledge of the primary rules of arithmetic and to be able to read and write, and there is a primary department in which so much is taught. The whole number of pupils up to 1880 is 1429; of these 353 have graduated, and not less than 90 per cent of the number have devoted themselves to the work of teaching those of their own color, thus fulfilling one of the great objects of the institution, which is to raise up teachers for the free schools of the south. From 10,000 to 20,000 colored children were taught by these graduates in 1879–80, and their work is highly prized by the educational directors of the south. Since 1878 the institute has had as pupils a considerable number of Indian children and youth, sent thither by direction of the Indian department in Washington, and the results of this effort to instruct them in the elements of civilized life are thus far of the most satisfactory character. The principal of the institute bears testimony to the safety and advantages of educating the sexes together.

HAMPTON ROADS (Hampton, *ante*), the lower part of an expansion of James river, Va., where it falls into Chesapeake bay. It is an important military point, and is defended by forts Wool and Monroe. The light at the entrance from the sea is in 37° 42′ n., and 76° 14′ w. During the war of the rebellion there were two naval engagements in and near Hampton Roads. Mar. 8, 1862, the frigate *Congress*, the sloop-of-war *Cumberland*, the steam frigates *Minnesota* and *Roanoke*, and the ship *St. Lawrence* were in the roadstead, when the *Virginia*, an iron-clad confederate craft, formerly the U. S. steam frigate *Merrimac*, which had been seized the year before, attended by two small steamers, came from Norfolk, passed rapidly by the *Congress*, exchanging broadsides, and ran directly into the *Cumberland*, which sunk in less than three-quarters of an hour. The *Congress* was disabled and set on fire, and eight hours later her magazine exploded. The other union vessels escaped. The union loss was 286; that of the confederates only about a dozen. The next day the union iron-clad *Monitor*, the first turret vessel ever used, appeared on the scene, and between her and the *Virginia* a long action ensued. The *Monitor* could not be run down nor boarded, and near night the *Virginia* gave up the fight and retired to Norfolk, leaving the strange little steamer unharmed.

HAMSTER, *Cricetus*, a genus of rodent quadrupeds of the family *muridæ*, resembling the true mice and rats in their dentition, but having cheek-pouches, and a short hairy tail. The COMMON H. (*cricetus vulgaris*) is a native of the n. of Europe and of Asia, abundant in many parts of Germany and Poland, but not found in Britain, and rare to the w. of the Rhine. It is of variable color; although generally reddish gray above, the belly black, the feet white, and large white spots on the sides, throat, and breast. It is larger and of stouter form than the common rat, the tail only about 3 in. long. It burrows in dry soils, each individual making a burrow for itself, to which there are more entrances than one, and which also contains several holes or compartments, one of them lined with straw or hay, in which it sleeps, and some of them capacious enough for the storing of large quantities of grain or other provisions—to the amount of 60 lbs. of corn or a hundredweight of beans—which the animal carries thither in its cheek-pouches, and on which it feeds during the milder parts of winter, spending the most severe part of that season in a state of torpid hibernation. It is a great pest to the farmers of the countries in which it abounds, and the object of their unceasing hostility; but it is very prolific, producing 2 or 3 broods in the year, and 16 or 18 at a birth. It feeds generally on vegetable food, as leaves, seeds, etc., although it is said also sometimes to devour small quadrupeds, birds, lizards, frogs, etc. The hamster carries away peas and other

legumes in pod, but shells them, and deposits only the edible portion in its store. Its labors and depredations are all carried on by night. It is an extremely fierce and pugnacious animal, and exhibits more than the pertinacity of the bull-dog. The skins of hamsters are of some value.—There are several other smaller species of the genus, mostly Asiatic.

HAN, the name of the most celebrated of the 26 dynasties of China (206 B.C. to 220 A.D.), founded by Kau-tsu, whose accession to the empire is regarded as the commencement of Chinese modern history. The number and character of its heroes and literati are superior to most other periods, and to this day the term *sons of Han* is the favorite appellation of the Chinese to themselves—the most common term for Chinamen.

HAN'APER OFFICE, a branch-office of the court of chancery, from which certain writs are issued. The name is derived from the fact that the papers and writs used to be kept in a hamper (*in hanaperio*).

HA'NAU, an industrious and flourishing t. in the Prussian province of Hessen-Nassau, is situated near the confluence of the Kinzig and the Main, 12 m. e.n.e. of Frankfort by rail. It is divided into the old and new town, the latter of which was founded, in 1597, by Protestant refugees from Belgium, who introduced the manufacture of woolen and silken goods, which still flourishes. The town of Hanau stands pre-eminent in Germany for its jewelry, and gold and silver wares, while it also carries on extensive manufactories of carpets, gloves, leather, cards, paper, hats, cutlery, tobacco, and cigars. Hanau has broad and straight streets; the buildings most worthy of note are the ancient castle; a gymnasium, in which the Wetterau library is located; and the electoral palace of Philippsruhe, famed for its orangeries, and once the property of Napoleon's sister, princess Pauline Borghese. Pop. '75, 22,730. In the neighborhood of the town, and on the left bank of the Main, are the baths of Wilhelmsbad and the village of Rumpenheim, with its palace and gardens. Hanau is celebrated as the scene of the last battles which Napoleon fought in Germany, Oct. 30 and 31, 1813, when, in his retreat from Leipsic, after a hard-fought battle, he totally defeated the allies.

HAN'CHINOL, *Heimia salicifolia,* a plant of the natural order *lythaceæ,* with lanceolate, frequently ternate leaves, and flowers on one-flowered stalks. It is a native of Mexico, and is much esteemed as a medicine for its very powerful sudorific and diuretic properties. It is highly extolled as an antisyphilitic.

HANCOCK, a co. in e. central Georgia, on the Ogeechee and Oconee rivers, intersected by the Macon and Augusta railroad; 500 sq.m.; pop. '80, 16,989—11,944 colored. The surface is uneven, and much of it is covered with forests. The soil is tolerably fertile, producing corn, cotton, etc. Various minerals are found. Co. seat, Sparta.

HANCOCK, a co. in w. Illinois, on the Mississippi, intersected by the Toledo, Peoria, and Warsaw, the Burlington and Quincy, and the Wabash railroads; 750 sq.m.; pop. '70, 35,935. It has an undulating surface of prairie and woodland, and the soil is very fertile. Corn, wheat, butter, and pork are the chief productions. Co. seat, Carthage.

HANCOCK, a co. in e. central Indiana, drained by Big Blue river, intersected by the Pittsburg, Cincinnati, and St. Louis, and the Cincinnati, Hamilton, and Dayton railroads; 300 sq.m.; pop. '70, 15,123. It is level, and about a third as yet timber-land. Chief productions: wheat, corn, and oats. Co. seat, Greenfield.

HANCOCK, a co. in n. Iowa, intersected by Boone and Iowa rivers, and the Milwaukee and St. Paul railroad; 576 sq.m.; pop. '75, 1482. The soil is fertile, producing corn, oats, etc. Co. seat, Concord.

HANCOCK, a co. in n.w. Kentucky, on the Ohio river; 200 sq.m.; pop. '70, 6,591—729 colored. It has an undulating and in some parts rough surface. Corn and tobacco are the main crops. Co. seat, Hawesville.

HANCOCK, a co. in s.e. Maine, on the ocean, drained by Penobscot and Union rivers, and including a large number of islands, of which Mt. Desert is the most important; 1700 sq.m.; pop. '70, 36,495. There are many ocean inlets affording good harbors, and in the interior there are numerous lakes and large forests. Butter and lumber are the chief products. Co. seat, Ellsworth.

HANCOCK, a co. in s.w. Mississippi, bordering on Louisianna and the gulf of Mexico; 500 sq.m.; pop. '70, 4,239—1186 colored. Surface level, soil poor. Co. seat, Bay St. Louis.

HANCOCK, a co. in n.w. Ohio, intersected by a branch of Auglaize river, the Lake Erie and Louisville, and the Cincinnati, Sandusky and Cleveland railroads; 525 sq.m.; pop. '70, 23,487. Surface level, with plenty of good timber; the soil a calcareous loam, producing wheat, corn, oats, etc. Co. seat, Findley.

HANCOCK, a co. in n.e. Tennessee, on Clinch river and the Virginia border; 300 sq.m.; pop. '70, 7,148—585 colored. It has a rough and mountainous surface, but the valleys are fertile, producing corn, wheat, pork, etc. Co. seat, Sneedsville.

HANCOCK, a co. in n. West Virginia, a narrow strip between the Pennsylvania line and the Ohio river; 90 sq.m.; pop. '70, 4,363—27 colored. The surface is uneven; soil is fertile, producing corn, wheat, oats, etc. Co. seat, Fairview.

HANCOCK, JOHN, 1737–93; b. Mass., graduated at Harvard, and went into commercial business with an uncle who (in 1764) left him a fortune. In 1766 he was a member of the colonial legislature. Two years afterwards a sloop owned by him, bearing the offensive name of *Liberty*, was seized by the crown officers, and the event created a riot in which the officers were roughly treated. After the Boston massacre Hancock was one of a committee to wait upon the governor and demand that the troops should be taken away from the city. Over the remains of the victims of the massacre he made an oration of great eloquence and greater boldness, which gave serious offense to the royal government, and led to an effort to seize the persons of Hancock and Samuel Adams, an effort which was the cause of the conflict at Concord. The provincial congress met at Concord in March, 1875, and both Adams and Hancock were members, the latter being president. The congress adjourned April 15, and on the night of the 18th men from Boston marched to Concord, arriving at 7½ A.M. on the 19th. A conflict followed, and ended in the battle of Lexington, and the beginning of the revolution. Hancock and Adams escaped, but both were by name exempted from the pardon promised by governor Gage. Hancock was president of the continental congress, and his name in a bold hand stands first among the signers of the declaration of independence, to which it was appended a month before the other signatures. He was in the Massachusetts constitutional convention, and the first governor of the new state, being (with a single interval) re-elected every year until his death. Much of his large fortune was spent for benevolent and useful purposes, Harvard college coming in for a share.

HANCOCK, WINFIELD SCOTT, b. Penn., 1824; graduated at West Point in 1844, and was for two years on the w. frontier in service. He was also in the Mexican war, and received the brevet of first lieut. for his behavior in the actions at Contreras and Churubusco. After that war he was about 10 years on frontier service in connection with the Indian troubles in Florida and the Mormon dissensions in Utah. In 1859 he was made quarter-master, doing duty in California, and by his energy and personal influence did much to keep that state within the union in 1860–61. Being ordered to Washington, at his own request, he was appointed brig.gen. of volunteers, and was prominent in the battle of Williamsburg and the engagement at Frazer's Farm. He was also in the contests of South Mountain and Antietam, in the latter fight being made a division commander on the field, soon after which he was promoted to maj.gen. At Fredericksburg and at Chancellorsville he was in command of the first division, 2d army corps, and was made corps commander (2d) in June, 1863. At Gettysburg he was in command at the point (on the left center) most furiously assailed by the confederates, and received a severe wound just at the close of the last day's fight. Congress voted special thanks for his gallantry on that occasion. The wound kept Hancock out of the field for nearly a year, but in 1864 he participated in the conflicts of the Wilderness, of Spottsylvania court-house, and Cold Harbor. In Nov. he organized at Washington the first corps of veterans. In recent years he has had department commands, the middle military division, the 5th military district, including Louisiana and Texas (1867–68), that of Dakotah, and, since the death of gen. Meade, the department of the east, with head-quarters at Governor's island, New York. In 1868 the democrats were inclined to make Hancock their candidate for president, but Horatio Seymour received the nomination. In the democratic national convention of 1880 Hancock was named, and had 171 votes on the first ballot (492 necessary for a choice), on the second ballot 319, when the nomination was made unanimous, and he was accepted as the leader of the party against the republican candidate, Hon. James A. Garfield; but in the election in Nov. he failed to receive a majority of the electoral votes.

HAND, THE. The genus *homo*, or MAN, takes rank in the classification of mammals as a distinct order, BIMANA, in consequence of man being the only animal possessing *two hands*. At first sight, it might be considered that four-handed animals—the monkeys, apes, and their allies, which are placed by zoologists in the order QUADRUMANA—were superior to those which possess only two hands, but this is far from being the case. None of these four hands are adapted to the variety of actions which the human hand is capable of performing, and they are all, in some degree, required for support and locomotion; so that while in the higher forms of the quadrumana the extremities present an approximation in structure to those of man, in the lower they gradually tend to resemble the ordinary quadrupedal type. "That," says Cuvier, "which constitutes the *hand*, properly so called, is the faculty of opposing the thumb to the other fingers, so as to seize upon the most minute objects—a faculty which is carried to its highest degree of perfection in man, in whom the whole anterior extremity is free, and can be employed in prehension." The peculiar prehensile power of the human hand is chiefly dependent upon the length, power, and mobility of the thumb, which can be brought into exact opposition to the extremities of all the fingers, whether separately or grouped together.

Before describing the hand itself, we must say a few words on the upper extremity generally, of which the hand may be regarded as the essential part.

The general arrangement of the bones of the arm will be readily understood by a reference to fig. 1. The general plan of the osseous framework of the upper and lower limb is very similar. The *humerus* or arm-bone corresponds to the *femur* or thigh-bone; the lower end of the humerus is connected with the two bones of the forearm, the *radius* and the *ulna*, which correspond with the two bones of the leg. Then come the *carpal* bones, the *metacarpal* bones, and the *phalanges*, just as we have *tarsal* bones, *metatarsal* bones, and *phalanges* in the foot.

In fig. 2 (which we copy from Humphry's *Human Foot and Human Hand*,) we have a diagram showing the way in which the bones of the hand are arranged. The carpal bones (3 to 10 in the figure) are eight in number, and are arranged in the wrist in two rows. The first or upper row consists practically of three bones (3, 4, 5), the fourth (6) being regarded as belonging to the class of *sesamoid bones* (q.v.), and the second row of four bones (7, 8, 9, 10); so that, excluding the pisiform bone (6), the carpal and the tarsal bones correspond in number. As we commonly term the palm the *front* of the hand, the thumb becomes conventionally the *outer*, and the little finger the *inner* digit; but according to the rules of comparative anatomy, and in order to compare the hand and foot, we ought to reverse these terms. The outer (3) of the carpal bones of the first row supports (through the intervention of 7 and 8) the bones of the thumb and forefinger (I and II), and constitutes with them the *outer* division of the hand. The inner (5) of the carpal bones bears the little, and the next (the ring) finger (V and IV), and constitutes with them the *inner* division of the hand; while the middle one (4) bears the middle finger (III), and belongs to the *middle* division of the hand. We likewise see from

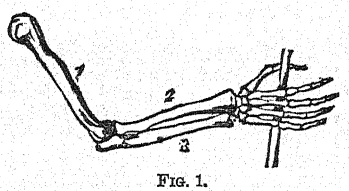


FIG. 1.

1 the humerus; 2, the radius; 3, the ulna. Beyond the distal ends of the radius and ulna come the carpal bones, the metacarpal bones, and the phalanges.

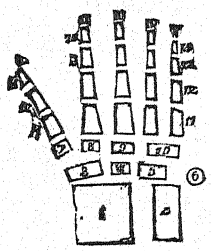


FIG. 2.

Diagram of the bones of the hand, with the ends of the radius and ulna.
1, end of radius; 2, end of ulna; 3, scaphoid; 4, semilunar; 5, cuneiform; 6, pisiform; 7, trapezium; 8, trapezoid; 9, magnum; 10, unciform; 11, 11, metacarpal bones; 12, 12, first row of phalanges; 13, 13, second row; 14, 14, third row; I, thumb; II, forefinger, etc.; V, little finger.

this figure, and likewise from fig. 1, that the two outer bones (3 and 4) are connected with the radius, while the inner bone (5) is connected (indirectly by a thick ligament) with the ulna.

It is unnecessary for us to enter into any anatomical details regarding the individual carpal bones. Collectively, they are so arranged that the carpus presents a dorsal convex surface, upon which the tendons of the extensor muscles of the fingers play, and a palmar concave surface on which the tendons of the flexor muscles lie. The several bones are joined to one another—each bone being united to three or more others—by a large extent of surface, and are girded together by strong ligamentous bands. The wrist is thus as strong as if it had been constructed of one solid piece of bone, while the slight gliding movements which occur between the several bones give it an elasticity which serves to break the shocks that result from falls upon the hand. The uppermost surface of the first row of carpal bones is convex, and this convex surface is received into a wide cup or socket, formed by the lower articular surface of the radius, and by a ligament passing from that bone to the ulna.

The metacarpal bones and the phalanges require no special description. Like the great-toe, the thumb has only two phalanges, while each of the other digits has three.

We shall now notice the various movements of which the hand is capable. They may be divided into (1) the different directions in which the hand collectively can be moved; and (2) the movements of which the hand itself, without reference to the arm, is capable.

The *scapula* or shoulder-blade, with which the principal arm-bone articulates, is itself movable to a very considerable extent on the surface of the ribs on which it rests. Again, the socket in which the nearly spherical head of the *humerus* or arm-bone lies is very shallow—not unlike the cup in the well-known toy *cup-and-ball*—and the arrangements of the shoulder-joint generally are such as to permit so great a variety, and so extensive a range of movements, that we are able to apply the hand to every part of the body. This freedom of motion is due in a great degree to the clavicles or collar-bones,

which, by steadying the shoulder-blades, and keeping the shoulders apart, afford a fixed point for the various muscles which we employ in raising the arms, in folding them over the chest, in the act of hugging, etc. The movement at the next junction of bones, the elbow-joint, is very different from that at the shoulder. The latter is termed, from its construction, a ball-and-socket joint, and admits of motion in all directions, within definite limits; while the elbow is a hinge-joint, and merely admits of bending and straightening, or, in other words, of motion in one plane. We have next to consider a class of movements of the forearm and hand, to which there is nothing analogous (at least to any material extent) in the leg. The movements in question are called "pronation and supination." In *pronation* (derived from *pronus*, with the face downwards), we turn the palm of the hand downwards, as in picking up any substance from the table; in *supination* (derived from *supinus*, with the face upwards), we turn the palm upwards, as for the purpose of receiving anything that may be placed in it.

These movements of pronation and supination are so important to the usefulness of the hand, that we must notice the three muscles by which they are chiefly effected. One of the three muscles passes from a projecting process on the inner side of the arm-bone, at its lower end, to the outer edge of the middle of the radius. Its contraction causes the radius to roll over, or in front of, the ulna. It thus pronates the hand, and is called a *pronator* muscle. Another muscle passes from a projecting process on the other side of the arm-bone to the inner edge of the radius near its upper part. It runs therefore in an opposite direction to the former muscle, and produces an opposite effect, rolling the radius and the hand back into the position of supination. Hence it is called a *supinator* muscle. The third is a very powerful muscle, termed the *biceps* (q. v.), which not only bends the elbow, but from the mode in which its tendon is inserted into the inner side of the radius, "also rotates the radius so as to supinate the hand; and it gives great power to that movement. When we turn a screw, or drive a gimlet, or draw a cork, we always employ the *supinating* movement of the hand for the purpose; and all screws, gimlets, and implements of the like kind are made to turn in a manner suited to that movement of the right hand; because mechanicians have observed that we have more power to supinate the hand than to pronate it." Supination can only be performed to its full extent by man, and even in man it is not the natural or habitual position; monkeys can partially effect the movement, and in most of the lower animals the part corresponding anatomically to the hand is constantly in a state of pronation.

The movements of which the hand itself, without reference to the arm, are capable, are very numerous, and in this respect differ considerably from the corresponding movements of the foot. Thus we can bend the fingers down upon the palm, or we can extend them beyond the straight line; we can separate them from one another to a considerable extent, and we can close them with considerable force. The wrist and hand are bent forwards or flexed upon the forearm by three muscles which pass downwards from the inner condyle or expanded end of the humerus, and are termed the *radial flexor*, the *ulnar flexor*, and the *long palmar* muscles. The first two of these muscles are inserted into wrist-bones on the radial and ulnar sides respectively, while the third expands into a fan-like *fascia* or membrane in the palm of the hand, and thus serves both to support the skin of the palm and to protect the nerves and vessels which lie below it. Beneath the palmar fascia lie two sets of *flexor* muscles of the fingers, and they present so beautiful a mechanical arrangement as to merit special notice.

The *superficial* or *perforated flexor* muscle passes down the front of the forearm and divides into four tendons, which become apparent after the removal of the palmar fascia, and are inserted into the second phalanges of the fingers, each tendon splitting at its termination, to give passage to the similar tendons of the *deep* or *perforating flexor* muscle, which passes from the upper part of the ulna to be inserted into the last phalanx of each finger. These *flexor* muscles are antagonized by the *common extensor* muscle of the fingers, which, like the flexors, divides into four tendons, one for each finger. Besides these, there is a special *extensor* of the index-finger, a series of muscles forming the ball of the thumb, which move that organ in almost every direction, and various small slips giving lateral and other movements to the fingers.

It is sufficient to observe that the hand is very richly supplied with blood-vessels and nerves, without entering into any anatomical details on these points. There is no part of the body where the sense of touch is so acute as at the tips of the fingers; but we shall defer to the article TOUCH, ORGANS AND SENSE OF, the consideration of the special arrangements which make this part of the hand peculiarly important in relation to our knowledge of external objects.

Our notice of the comparative anatomy of the foot (q. v.) renders it unnecessary to trace the modifications presented in the lower animals by the bones corresponding to those of the human hand; as the carpal and metacarpal bones with their phalanges undergo adaptations of form to meet the individual wants of the animal, very much in the same manner as the tarsal and metatarsal bones and their phalanges. Thus, the reader will readily see that the so-called knee of the horse, for example, is the carpus, and he will have no difficulty in tracing the metacarpal bones and phalanges. See the articles BROKEN KNEES and HORSE; and Humphry, *On the Human Foot and Human Hand.*

HAND, a co. in s.e. Dakotah, oraganized after 1870; 1,000 sq.m.; very little settled. The streams are affluents of the Missouri and the Dakotah.

HANDÉL, GEORGE FREDERICK, one of the greatest of musical composers and musicians, though a native of Germany, spent so large a portion of his life in England, where he composed his greatest works, that Britain may almost claim him as her own. He was born at Halle, Upper Saxony, Feb. 23, 1685. He manifested in infancy an extraordinary passion for music, and at the age of seven, having accompanied his father on a visit to the duke of Saxe-Weissenfels, he found his way to an organ, where he was heard by the duke, who remonstrated with his father against further opposition to a genius of so decided a character. He was now placed under a music-teacher, Zachau, where he remained until he was 13, composing every week cantatas for the church-service, and learning all instruments, especially the organ. In 1698 he was sent to Berlin, where the elector of Brandenburg was so impressed with his talents, that he wished to send him to Italy. As his father would not accept this offer, he returned to Halle, whence, on the death of his father, he went to Hamburg in 1703. Here he played a violin in the orchestra of the opera. He was soon its director, and composed his first opera, *Almira*, which was rapidly followed by *Nero* and *Florinda*. His violent temper involved him in a quarrel with a brother-composer, which resulted in a duel; the sword of his adversary was stopped by a button or a music score. He next visited Italy. In Florence, he composed *Rodrigo*, 1707. His *Agrippina*, composed in Venice, had a run of thirty nights. At Rome, he was received at cardinal Ottoboni's, where he heard Corelli, and beat him with his own violin, for not playing to suit him in his *Il Trionfo del Tempo*. In 1710 he returned to Germany, where he was appointed chapel-master to the elector of Hanover, afterwards George I. At the close of the same year he went to England, where he was patronized by queen Anne and the nobility. He composed *Rinaldo, Pastor Fido, Theseus*, and in 1715, *Amadis da Gaula*, in which Nicolini and Valentini first sung in England. In 1718 he undertook the direction of the duke of Chandos's chapel at Cannons, where he wrote *Acis and Galatea, Esther*, the first English oratorio, and numerous concertos, anthems, fugues, etc. A royal academy of music for the cultivation of the opera, was formed in 1720, and, after some competition, was placed under Handel's management. This undertaking, and other opera speculations, in which Handel was engaged, proved very unsuccessful. Handel lost £10,000, and was compelled to retire to Aix-la-Chapelle on account of his health. The oratorio *Deborah* was composed in 1733, and was followed by *Alexander's Feast, Saul, Israel in Egypt*, and (1740) *L'Allégro e Penseroso*. In the end of 1741 he went to Dublin, where his *Messiah*; composed in that year, was produced for charitable purposes. He remained in Dublin about nine months, and received a generous support. From this time success attended all his undertakings. On his return to London, he composed his *Samson;* and the *Messiah* was performed for the benefit of the foundling hospital. It was repeated annually for the same purpose, and from 1749 to 1777 brought to that charity £10,300. Handel became blind, but he still composed, and played on the organ, being led to his seat, and forward to receive the plaudits of the audience. He assisted at the performance of one of his oratorios on April 6, and he died as he wished, on Good Friday, April 13, 1759, "in hopes," he said, "of meeting his good God, his sweet Lord and Savior, on the day of his resurrection." Among his works, which are in the queen's library, are 50 operas—8 German, 26 Italian, 16 English; 20 oratorios, a great quantity of church-music, cantatas, songs, and instrumental pieces. He was a wonderful musician, and his compositions are often full of grandeur and sublimity. His operas are seldom performed, but his oratorios hold the same place in music that in the English drama is accorded to the plays of Shakespeare; and the Handel festivals, lasting several days, are the grandest musical exhibitions of our times. See Chrysander's *Georg Friedrich Handel* (1858–67).

HAND-FASTING, the ancient term for betrothment, now disused.

HAND-GLASSES are very useful implements of gardening, for the protection of tender plants. They are of various kinds, some of them simple bells of glass, with a knob at top, for convenience of lifting them, chiefly used for covering cuttings in the greenhouse or stove, until they *strike* or send forth roots; whilst others consist of metal frames—zinc, lead, iron, or copper—filled up with panes of glass, and sometimes of a size large enough to be used for covering tree-pæonies, acacias, and other tender shrubs.

HANDICAPPING is the term used in various games and sports to denote the placing of competitors, good, bad, and indifferent, on such a footing that all shall have, as nearly as possible, an equal chance of winning. Thus, in horse-racing, when the speed of one horse has been ascertained to be greatly superior to that of another, the swifter of the two, in a handicap race, is made to carry extra weight to an amount that shall be deemed sufficient to reduce its speed to a level with that of its antagonist. Where the public performances of a horse have been exceptionally good, and when both speed and endurance are found to be of an unusually high character, the penalty inflicted in all future handicaps is very great, amounting sometimes to a weight several stones above that of very inferior competitors. The *beau idéal* of a handicap would thus be one in

which the merits of the animals should be so nicely discriminated, and the weights so accurately adjusted, that all the competitors should pass the winning-post at the same time, and thus run a "dead-heat." This is, of course, impossible in practice, but it is nevertheless the ideal at which the handicapper must aim; and the nearer he approaches to it, the more perfect is his work. In racing, no jockey with his saddle, etc., must weigh less than five stone seven pounds, but the maximum is left in the hands of the handicapper, who apportions to each horse a weight corresponding to its public performance, age, and sex. No appeal is allowed from his decision, nor can he be called upon to give the reasons that may have actuated him in allocating weights. Vested with such arbitrary power, he should be a person of sound judgment, unquestionable integrity, and thorough experience. His usual mode of constructing a handicap is to select the best and the worst horse entered for a race, placing such a weight upon the former as he supposes shall bring it down to a level with the latter's minimum of five stone seven pounds. He then proceeds to adjust the weights of the intermediate horses according to their varied merits.

When the handicaps have been published, no alteration can take place in the relative weights of the horses entered, unless one of these should prove a winner during the time intervening between the issue of the handicap and the period of its decision; in which case, extra weight, varying from three pounds and upwards, may have to be carried by the winning horse, as a penalty for his intermediate victory. Each jockey, with his saddle, etc., is weighed prior to starting, the exact extra weight to be carried being made up by lead strips let into the saddle-flaps. He is also weighed *after* the race, to prevent the possibility of his having carried either more or less than his proper weight; a precaution, moreover, that is rigorously observed after every kind of race, whether handicap or otherwise.

Though principally pertaining to horse-racing, handicapping is resorted to in many other sports. In pigeon-shooting from traps, the shooter stands, as a rule, 21 yards from the traps, that being the distance usually allowed to average performers. The more skilful the shooter, the further back has he to stand from the traps; the distance allowed by an acknowledged "crack" shot to his inferiors ranging from 1 to 10 or even 15 yards. In games such as chess and draughts, certain "men" are allowed to the inferior player; in billiards, the better of two allows his antagonist a certain number of "points," so as to equalize or handicap their respective games; at cricket, an eleven, such as the eleven of all England, will sometimes play against twenty-two others; the competition being at times very close. In swimming and in pedestrianism, the inferior competitors are allowed a certain "law," or start; in yachting, the vessel of greater tonnage is handicapped with lesser ones, by allowing them extra time for the performance of the race. For instance, a 50 and a 30 ton yacht start for a race, the former allowing the latter, say, five minutes. They *start together*, and the heavier yacht reaches home, say, three minutes ahead of the lighter; in that case, the lighter yacht's handicap of five minutes gives her the race by two minutes, though she was last to reach home. The principle of handicapping is the same, whether applied to field-sports or home amusements; it is the art of endeavoring to equalize, by certain penalties, the good, bad, and indifferent.

HANDLEY, GEORGE, 1752–1793; a native of England who came to Georgia and served in the patriot army in the revolutionary war. He was governor of Georgia and held a number of less important offices.

HANDS, IMPOSITION OF, a ceremony which has been employed both in ancient and modern religious use as symbolizing the conferring of certain interior, and, generally speaking, spiritual gifts. In the consecration of Aaron and his sons, they are directed to lay their hands upon the heads of the victims which were to be offered in sacrifice (Ex. xxix. 10, 15, 19). Moses set Joshua apart as the leader of the people by "laying his hands upon his head" (Num. xxvii. 23). Our Lord is entreated to heal the ruler's daughter (Matt. ix. 18) by the same ceremony. This is the rite which he himself adopts in blessing the little children (Matt. xix. 15). The gift of the Holy Ghost was imparted by the same ceremony (Acts viii. 17), and the ministers placed by the apostles in the newly founded churches were similarly installed (1 Tim. iv. 14). In the early church, the rite of imposition of hands was employed in the receiving of catechumens and the reconciliation of penitents. From its use in confirmation, that rite is commonly designated by the fathers under the name of imposition of hands. In the ancient church, this rite existed in two forms: the actual laying on of hands, which was called *chirothesia;* and the extending the hand over or towards the person, which was styled *chirotonia.* In the Roman Catholic church, the former is retained as an essential part of the sacraments of confirmation and holy orders; the latter is employed in the administration of the priestly absolution. Both forms are familiarly used in blessing. In the mass, also, previous to the consecration of the elements of bread and wine, the priest extends his hands over them, repeating at the same time the preparatory prayer of blessing. See Wetser's *Kirchen-Lexicon,* vol. iv. 853. The rite of imposition of hands is used both by the Episcopalian and Presbyterian churches in the ordination of ministers. It also forms part of the ceremony of confirmation in the Anglican and in the Lutheran church. See Palmer's *Antiquities of the English Ritual;* Keeling's *Liturgiæ Britannicæ.*

HANDSEL, sometimes used to denote earnest-money, or part-payment, by way of binding a bargain. In Scotland it popularly signifies a first transaction in trade, as, for example, the first sale effected in the day or week; and is likewise employed to signify a present in the nature of a new year's gift on the first Monday in the year—hence called handsel Monday.

HAND-TREE, *Cheirostemon platanoides*, a large tree of the natural order *stereuliaceæ*, which receives its name from the peculiar appearance of its flowers. These have no corolla, but a large 5-lobed and angular colored calyx—bright red within—from which project the five stamens, united by their filaments into a column, and separating and curving at the summit, where they bear the anthers, so as to have some resemblance to a hand or claw. It is not merely this, however, which makes the tree an object of interest, but the circumstance that it is an object of superstitious veneration to the Mexicans; a single tree near Toluca, which is mentioned in the earliest histories, being asserted by them to be the only one in the world, and their eager gathering of its flowers always preventing its multiplication by seed. It was not till 1801 that cuttings were obtained from it for the botanic garden of Mexico, where the young plants have since produced seed abundantly. The tree has also been found in great abundance in Guatemala. It is a lofty tree with a thick trunk, a habit similar to that of a plane, and broad maple-like leaves.

HAND-WRITING, in law, is proved by calling a witness who either saw the individual write the identical words, or who by correspondence, or by having previously at other times seen the same person write other papers, can swear that he believes the paper is the hand-writing of the individual to whom it is attributed. Sometimes, where no direct evidence can be had, engravers and others accustomed to compare the niceties of hand-writing are allowed to give their evidence, or rather state their belief as to the writing; but this kind of evidence is looked upon with great suspicion, and is much discountenanced. In cases where a jury are called upon to determine a disputed question of hand-writing, they are now allowed in England to form their own opinion by comparing the disputed writing with other writings admitted to be by the same party. This could not be done before 1854, but it is done now in both civil and criminal cases. In Scotland, a jury may also be allowed to judge of the hand-writing in this way in any case. In some countries—as, for example, in Scotland—a will, if written in the testator's hand-writing, is admitted to be genuine without the attestation of witnesses, being then called a holograph (q.v.) instrument; but there is no such privilege in England or Ireland, as all wills, by whomsoever written, must be attested by witnesses.

HANG-CHOW-FOO, the capital of the province of Che-keang, in China, on the left bank of the Tsien-tang, where that river disembogues into the bay of Hang-chow-foo, is situated at the commencement of the grand canal, in lat. 30° 18′ n., long. 120° 15′ east. It is about 150 m. s.e. of Nankin. Hang-chow-foo is the most magnificent city of China—a Chinese proverb makes it a heaven upon earth. It was the capital of the empire during the rule of the Mongols, when it was visited by the celebrated Marco Polo early in the 14th century. There are ten gates through its lofty walls, which are 20 m. in circumference, but there are more inhabitants without the *enciente* than within. The population is estimated by Dr. Macgowan at 800,000. The streets, which are of greater width than is usual in Chinese cities, are well paved, and in some directions lined for miles with elegant shops and extensive warehouses. The terminal ramifications of the grand canal are spanned by countless elegant bridges. Hang-chow-foo is celebrated for its silk manufactures, and its embroidery excels that of any part of China. Mulberry-trees occupy every vacant spot within and without the walls. No city in China, unless it be that of Suchau, possesses wealth to compare with that of this remarkable place, which, moreover, is the most literary and most religious part of the empire. Colleges and temples, *literati* and priests, abound and flourish in Hang-chow-foo. The imperial library in the palace of Kienlung, and the literary institutions, appear, however, to be going to decay, and could not at any period have had much educational influence. One cause of the celebrity of the city is found in the beauty of its environs. The tower of the thundering winds, although in ruins, is still an imposing edifice; while monumental gateways, light airy bridges, and temples of the size of villages, render the natural beauties of the city highly picturesque. One of the temples possesses 500 images of the Io-han (Buddhist saints), of the size of life, richly covered with gold. Nothing can exceed the beauty of the valleys opening into the lake, richly adorned as they are with trees, chiefly the camphor and tallow trees, and the arbor vitæ. From a remote period, these scenes have been the resort of pilgrims, and every spot is hallowed by some legendary incident. At one place there is an image of Buddha, cut out of the solid rock, measuring 48 ft. from shoulder to shoulder. The nose is 7 ft. long, and the other parts are of a proportional size; it is gilt over like wooden and clay images of the same personage. The protruding rocks are profusely carved with religious inscriptions and images of mythological characters. The n.e. section of Hang-chow-foo is called the Tartar city, being exclusively devoted to the Mantchu garrison or military colony. It is separated from the Chinese city by a low wall. About 25 m. below the city is Kanpoo, once a mart of considerable importance, the port of Hang-chow-foo, when that city was the metropolis of China, described by Marco Polo as an extremely

flourishing place; fluvial changes have rendered it inaccessible to any but small, flat-bottomed vessels. Chapoo, about 50 m. distant, situated on the n. of the bay, is now the port of Hang-chow-foo. Chapoo has also a Tartar city; it communicates by branches of the grand canal with Hang-chow-foo and Shanghai. It is the port to which Chinese trade with Japan is restricted. Hang-chow-foo suffered considerably at the hands of the rebel Tae-pings (q.v.), by whom it was captured.

The configuration of the bay of Hang-chow-foo and the embouchure of the Tsien-tang river, which empties into it near the provincial capital, favors the formation of the tidal phenomenon designated an eagre or bore. See BORE. Dr. Macgowan, the first European who has witnessed this magnificent spectacle, has published an account of it in the *Proceedings of the Asiatic Society of Hong-kong*. As the tide rushes into the mouth of the river, it becomes elevated to a lofty wave, which attains its greatest magnitude opposite the city of Hang-chow-foo. Generally, there is nothing remarkable in its aspect, except at the period of the vernal and autumnal equinoxes, the maximum being at the latter season. As the hour of flood-tide approaches, crowds gather in the streets running at right angles with the river, but at safe distances; boatmen stop lading and unlading their vessels, and put out into the middle of the stream. The center of the river teems with craft. Loud shouting from the fleet announces the appearance of the flood, which seems like a glistening white cable stretched athwart the bay as far down as the eye can reach. Its noise, compared by native poets to that of thunder, speedily drowns that of the boatmen; and as it advances with prodigious velocity, it assumes the appearance of an alabaster wall, or rather of an advancing cataract 4 or 5 m. across, and about 30 ft. high. As the foaming wall of water dashes impetuously onward, one trembles for the safety of the floating multitude. They cease shouting, and devote their energies to the steadying of the prows of their vessels toward the advancing wave, which threatens to submerge everything afloat; but they all vault as it were to the summit with perfect safety. This grand and exciting scene is but of a moment's duration; the wave passes up the river in an instant, but from this point with gradually decreasing force, volume, and velocity, disappearing entirely a few miles above the city. From ebb to flood tide, the change is almost instantaneous; a slight flood continues after the passage of the wave, but it soon begins to ebb. Within the historic period, numerous changes have been effected by the action of this wave, the most noted being the removal of a rocky islet from the center of the river opposite Hang-chow-foo. Chinese ingenuity has been long exerted, with imperfect success, in preserving the alluvial plain from the wasting action of the eagre. The history of the dikes that have been successively erected, of failures and disasters, found in the local annals, show that, like the Yellow river, this part of the Tsien-tang has been a constant source of anxiety and expense to the government, costing about $130,000 per annum.

HANGED, DRAWN, AND **QUARTERED,** the description of the capital sentence on a traitor, which consisted of drawing him on a hurdle to the place of execution, and after hanging him, dividing the body into quarters. This punishment was substituted by the stat. 54 Geo. III. c. 146, for the ancient more barbarous sentence of disemboweling alive, but the crown has power to reduce the sentence to simple beheading. See also HANGING.

HANGING is the mode by which capital punishment is carried out in the United Kingdom. In England, formerly, in atrocious cases, it was usual for the court to direct a murderer to be hung upon a gibbet in chains near the place where the crime was committed—also at a later period to order the body to be dissected—and the execution to take place on the next day but one after the sentence was passed. But these useless severities were abolished by the stat. 6 and 7 Will. IV. c. 30.

The mode of punishing by hanging was first adopted in England in 1241, when Maurice, a nobleman's son, was hanged for piracy. Other more barbarous modes of inflicting death were long in use, being prescribed by statute, but have been abolished, and hanging has long been the ordinary, because the most humane, mode of executing capital punishment. In treason, hanging is part of the statutory punishment, coupled with mangling the body, though the crown may change the sentence into simple beheading, except in the case of women, who are only hanged, in deference to their sex. Formerly, in Scotland, on the other hand, a capital sentence pronounced south of the Firth of Forth could not be executed within less than 30 days; and if pronounced north of the Firth, within less than 40 days after it was pronounced. But now, in both cases, the day of execution must not be less than 15, nor more than 21 days, south of the Firth; nor less than 20, nor more than 27 days, if north of the Firth, after sentence passed. Until recently, the hanging or execution took place in public. See EXECUTION.

The cause of death in hanging is complex. The compression of the windpipe by the cord, the obstruction of the return of venous blood from the head, and of the flow of arterial blood to the brain, the stretching or tearing of the nervous structures of the neck, and in some instances dislocation or fracture of the vertebræ, may concur in the production of the fatal effect, which, though attended with violent struggles in some cases, is probably as nearly instantaneous as possible. The subject, in its relations to medical jurisprudence, will be more fully considered under the title STRANGULATION.

HANGING GARDENS. The hanging gardens of Babylon were anciently reckoned among the wonders of the world. Their construction is variously ascribed to queen Semiramis, and to Nebuchadnezzar—seven centuries later, but still more than five centuries B.C.—who is said to have made them for the gratification of his Median queen, Amytis, because the Babylonian plain seemed dreary to her in comparison with the varied and romantic scenery of her native land. Diodorus and Strabo have given particular descriptions of them; and although it is remarkable that they are not mentioned by Herodotus, whilst Quintius Curtius speaks of them as "fabulous wonders of the Greeks"—an opinion which some of the learned in modern times have adopted, denying their very existence—yet the probability seems to be in favor of the general accuracy of the descriptions, and even that the ruins of this celebrated structure are to be recognized among the mounds which mark the site of Babylon. See BABYLON. The hanging gardens are said to have formed a square, with an area of nearly four acres; but rising in terraces curiously constructed with stone pillars, across which were placed stones, covered with reeds and bitumen, and again with bricks united by cement; above these, sheets of lead, to prevent moisture from flowing down, and finally a sufficient layer of earth; the summit being elevated three hundred feet above the base, so that at a distance the whole presented the appearance of a pyramidal wooded hill. There was a large reservoir at the summit, which was filled with water by pumping from the Euphrates, for the irrigation of the gardens, and the supply of their numerous fountains. Fountains and banqueting rooms were distributed throughout the numerous terraces; groves and avenues of trees, as well as parterres of flowers, diversified the scene; whilst the view of the city and neighborhood was extensive and magnificent.

HANIFAH, called also ABU-HANIFAH, 699–767; an Arabian, and founder of the Hanifites, the oldest of the sects of Mohammedans considered orthodox. Because he opposed the caliph's persecution of the people of Mogul he was forced to poison himself. He was the author of a commentary on the Koran.

HANKOW', in lat. about 30° 30′ n., and long. 114° e., a port of China, at the junction of the Han river with the Yang-tze-kiang, 600 miles from its mouth. It consists of three cities, the principal being Wu-chang-foo, on one side of the Han river, and Han-yang-foo on the opposite side. Strictly speaking, Hankow is a suburb of the former. It was destroyed during the Tae-ping rebellion, but has since been rebuilt, and has a population of from 500,000 to 1,000,000. English and American steamers ply regularly and frequently between Hankow and Shanghai. Vessels of large size can reach the city; the river is navigable 360 miles higher up, to the city of Ichang. Powerful flat-bottomed steamers are requisite for navigating this part of the Yang-tze-kiang, the current running at from seven to eight knots per hour. The principal export is tea. Other native products exported are silk, oil, tallow, tobacco, and wax. The chief imports are cotton piece-goods, woolens, metals, Straits and Japanese produce. The value of the exports, in 1870, was £4,434,129; and in 1871, £5,578,258; of the imports, in 1870, £5,938,314; and in 1871, £6,756,631. In 1875 the exports and imports were respectively valued at £5,652,094 and £4,853,810.

HANLEY, a t. of Staffordshire, England, in the district known as *the potteries*, and included in the parliamentary borough of Stoke-upon-Trent (q.v.). It is two miles and a half from Newcastle-under-Lyme, about one m. from Stoke, and one m. from the North Staffordshire railway station and canal offices. The principal portion of the town has an elevated site. The streets are not very regular, but they are wide and well paved; and many of the houses are well built. There are several commodious market-places. There are numerous places of worship of the church of England and other denominations. Among the public institutions is an infirmary.—Contiguous to Hanley is SHELTON, which may be regarded as forming with it one town. The manufacture of earthenware and china is the principal employment of the inhabitants of both. At Shelton is a villa called Etruria, erected by Josiah Wedgwood, remarkable for the Etruscan vases with which it is ornamented, imitations of ancient vases found in Italy, and the study of which was of great use to him in his endeavors to improve the manufacture of earthenware. The pop. of Hanley in '71 was 39,976.

HANNIBAL, a city in Missouri, U. S., on the w. bank of the Mississipi, 132 miles above St. Louis. It is the terminus of the Hannibal and St. Joseph and other railways, and has steamboat communication with various towns on the Mississippi. It has a large trade in pork, tobacco, hemp, and grain, with mills, foundries and machine-shops. It has a college. Pop. '70, 10,125.

HANNIBAL (*ante*), a city in Marion co., Mo., on the Mississippi, about 150 m. above St. Louis, the terminus of the Hannibal and St. Joseph, and the Missouri, Kansas and Texas railroads; has communication with St. Louis, by the river, and by the St. Louis, Keokuk and Northwestern, and with the e. by the Wabash railroad; pop. about 15,000. The inhabitants are extensively engaged in manufacturing, and there is a large trade in lumber and produce. Here is the seat of Hannibal college (Meth. Epis. South), founded in 1868.

HANNIBAL (*the gift of Baal*) was a common name among the Carthaginians, the list of those famed in history extending to fourteen or fifteen. But the greatest of all the

Hannibals was the famous son of Hamilcar Barca. He was b. in 247 B.C. When he was nine years old, he accompanied his father on his Spanish expedition; and before starting, swore that oath of eternal hatred to the Roman name, which he kept so faithfully throughout his whole life. After the death of Hamilcar, he was employed by Hasdrubal, his brother-in-law, in most of the military operations which he undertook. Such was the esteem in which he was held by the soldiers, and such a reputation for bravery and strategic skill had he gained, that when Hasdrubal was assassinated, the army with one voice elected him commander-in-chief, an appointment which the authorities at Carthage at once ratified. Hannibal, at this time in his 29th year, undertook the command with ready zeal, for he longed to realize the legacy left him by his father, and to strike a death-blow at his country's rival by attacking her on her own soil. But before he entered on a task of such magnitude, he deemed it prudent to complete the subjugation of Spain, and accordingly spent two years in contests with some tribes hitherto independent of Carthage. Saguntum, a city in alliance with Rome, was attacked by him on the ground that its inhabitants were making aggressions on the Torboletes, subjects of Carthage. After a siege of eight months, the city was taken; and the Romans, after an embassy had unsuccessfully demanded the surrender of the general who had thus wantonly violated the treaty, declared war in 218 B.C. Having taken measures for the defense of Africa and Spain during his absence, he started from New Carthage in 218 B.C., with 90,000 foot, and 12,000 horse. This force was very much thinned by his contests with the tribes between the Iberus and the Pyrenees, by the necessity of leaving Hanno with 11,000 men to keep them in subjection, by desertion in the passage of the Pyrenees, and by his sending home a portion of his Spanish troops. His object in this last act was to inspire the soldiers with thorough confidence in themselves and their general. From the Pyrenees he marched to the Rhone without opposition, since Scipio was at Massilia (Marseille), four days' march from the point where Hannibal crossed the river in the face of the Celtic hordes who sided with the Romans. His next great difficulty was the passage of the Alps, which he effected in fifteen days, in spite of the attacks of the mountain tribes, the snows, storms, and other difficulties. Much discussion has taken place among learned men whether Hannibal crossed the Cottian Alps by the pass of Mont Genevre (or Cenis), or the Graian Alps by the pass of Little St. Bernard. For the former route, Michelet, Thierry, and most French writers argue; and for the latter, with better reasons, Niebuhr, Arnold, Mommsen, etc. After allowing his army (now about 26,000 strong) some time to recruit in the rich villages of the friendly Insubrians, he first subdued the Taurini, a tribe hostile to the Insubrians, and took their chief city after a siege of three days; and thus forced into alliance with him all the Ligurian and Celtic tribes on the upper course of the Po. Scipio, having returned from Massilia, took the command of the army in the north of Italy, and first met Hannibal on the plain near the river Ticinus. The Romans were entirely routed; and Scipio, who was severely wounded, retreated across the Po. The armies again met at the Trebia, with a like result, though the Romans, who had received reinforcements, were much more numerous. These battles were fought in 218 B.C. Having wintered in the neighborhood of the Po, and levied additional troops among the Gauls, most of whom were now his friends, Hannibal started southward so soon as spring permitted, marching through Liguria and the swamps of the Arno. In this difficult route, immense numbers of his beasts of burden and horses perished, and he himself lost the sight of one eye. He next inflicted a severe defeat, near lake Thrasymene, on the consul Flaminius: thousands perished by the sword, including the consul, and thousands in the lake, while 15,000 were taken captive, Hannibal losing only 1500. After this victory, he crossed the Apennines to Picenum and Apulia, and thence re-crossed to the fertile Campania, which he ravaged. Thither Fabius was sent with an army to oppose him, but no general engagement took place, the consul endeavoring to lead Hannibal into snares, which he succeeded in doing; but the wily African extricated his army by a stratagem, and returned to Apulia. He wintered at Cannæ, and in June, or according to others, in Aug. (2d) of 216 B.C., almost annihilated a Roman army of 90,000 men under Terentius Varro and Æmilius Paulus, in the battle, which was fought a little below the town. About 50,000 are said to have fallen, including Æmilius Paulus, and a host of Roman knights, senators, and other distinguished persons. Here Hannibal committed, perhaps, the greatest military error of his life, in not marching direct to Rome; but it is supposed that he refrained, in order to allow the tribes of Italy to declare in his favor. Many in the south of Italy did attach themselves to his interests, but not in such numbers as he had anticipated. After some delay he marched on Neapolis (Naples), which he did not succeed in taking, but the gates of Capua were opened to him, and here he wintered. The enervating effect which the luxury of Capua is said to have had on his army has been greatly overdrawn, but his residence there forms, in one point of view, the turning-point in the war, which from this time became more of a desultory kind. Hannibal's great purpose was to arm the Italian nations against Rome, and so to crush her power by means of her own subjects; the Romans, on the contrary, henceforth avoided coming to a pitched battle with the Carthaginians, but sought rather to keep the tribes in awe, and harass Hannibal and his lieutenants by small armies in different parts of the country. Hannibal traversed Italy in all directions, surprised the Roman generals, defeated

their armies, captured their towns, such as Casilinum, Arpi, Tarentum, Metapontum, Thurii, Locri, and many others; he defeated Centenius near Capua; Cn. Fulvius at Herdonea; Fulvius Flaccus on the Anio; Crispinus and Marcellus in Lucania; and the besieging army before Locri: in all these cases the armies were almost annihilated. The defeat of Hasdrubal, his brother, at the river Metaurus, and the loss of his army, compelled Hannibal to confine himself to the mountainous peninsula of Brutium, where for four years he resisted all the efforts of the Romans to dislodge him. At length, after having maintained himself in Italy for upwards of fifteen years, he was recalled to Africa, to defend his country against Scipio; but notwithstanding his utmost exertions, and the bravery of his veteran troops, he was defeated by Scipio, near Zama, with a loss of 20,000 men. Peace was concluded in the following year (201 B.C.).

Hannibal's darling scheme had in the meantime been baffled, but his hatred to Rome was not diminished, and accordingly he set himself with all his zeal to make preparations for a still more deadly struggle at some future day. He turned his attention, in the first place, to political reforms, and some constitutional changes which were loudly called for, by which he placed the finances on a better footing. But his enemies accused him to the Romans of stirring up Antiochus III. of Syria to make war on them; and when ambasssadors came to Carthage, Hannibal fled to the court of Antiochus at Ephesus. In the war which followed, he took no conspicuous part, but the king bitterly regretted afterwards that he did not take the advice of Hannibal to carry war into Italy. When peace was concluded, the surrender of Hannibal was one of the conditions; but foreseeing such a result, he fled to Prusias, king of Bithynia, for whom he gained a naval victory over Eumenes, king of Pergamus. He was at length demanded by the Romans; and seeing no hope of escape, he took poison, which he always carried with him for such an emergency.

Among ancient authorities, the reader may consult, with great profit, Polybius, Dion Cassius, Plutarch, and Appian; and of the moderns, Arnold, Niebuhr, Mommsen, Ihne, and the other historians of Rome. For military operations specially, see Vandoucourt, *Histoire des Campagnes d'Annibal en Italie.* Hannibal's life has been recently made the subject of a tragedy by prof. Nichol of Glasgow.

HANNO (perhaps the father or the son of that Hamilcar who fell at Himera in 480 B.C.) is famed for a voyage of discovery which he made along the w. coast of Africa, to found Libyo-Phenician towns. His expedition is said to have consisted of 60 ships and 30,000 men and women. One city was built not far from the strait of Gibraltar, and others along the coast reaching to cape Bojador. He went south as far probably as Sierra Leone. On his return to Carthage, he inscribed an account of his voyage on a tablet, and placed it in the temple of Kronos (Saturn), or, according to others, of Juno. It seems to have been written in the Punic language; the version of it which remains is only a Greek translation. The *Periplus* has been published on the continent by Gelenius, Boecler and Müller, and Berkel, and with an English translation by Falconer (Lond. 1797). Great discussions have taken place among the learned as to the *time* when Hanno's voyage was made (the best authorities favoring the period of about 570 B.C.); as to *the* Hanno out of all the many Hannos of history; and as to the facts stated in the *Periplus;* but on these we cannot enter. Some recent writers find evidence in it of the existence of the *gorilla* in those ancient days. For a full discussion of the subject, consult Dodwell's Dissertation (in Hudson's *Geographi Minores*); Bougainville's Essay (*Mém de l'Acad. des Inscript.* xxvi. p. 10, and xxviii. p. 260); also Falconer, in his edition already referred to.

HANNO, called the great, d. 202 B.C.; a Carthaginian general. In the first Punic war he captured Hecatompylus. With Hamilcar he was victorious over the mercenaries, and when war was over he was the leader of the aristocratic party, and opposed Hamilcar and his sons.

HANOVER, a co. in e. central Virginia, between Chickahominy, Pamunkey and North Anna rivers, intersected by the Chesapeake and Ohio, and the Richmond, Fredericksburg and Potomac railroads; 400 sq.m.; pop. '70, 16,455—8,562 colored. It has a hilly surface, with much forest land; productions: corn, oats, and tobacco. Co. seat, Hanover Court House.

HANOVER, formerly a kingdom of northern Germany, but since 1866 incorporated with Prussia. (The following description refers chiefly to the state of things before the union; for more recent information, see PRUSSIA). Hanover extends from 51° 18′ to 53° 52′ n. lat., and from 6° 43′ to 11° 35′ e. long. It may be divided into three distinct districts, viz: 1. The eastern, which consists of the duchy of Bremen cum Hadeln, a section of the duchy of Lauenberg, the duchy of Werden, the principalities of Lüneburg, Kalenberg, and Hildesheim, and the countships of Hoya and Diepholz; 2. The western (separated from the former by the duchy of Aldenburg) comprises the duchy of Aremberg-Meppen, the principalities of Osnabrück and East Friesland with the Harlingerlands, the lower countships of Lingen and Bentheim, and the circle of Emsbühren, which formerly belonged to the see of Munster; 3. The southern, which is separated from the other Hanoverian territories by Brunswick, and comprises the principalities of Grubenhagen and Göttingen, together with the districts of Elbingerode and Ilfeld. Hanover is bounded n. by the German ocean and the river Elbe, e. by Mecklenburg and

Prussian Saxony, s. chiefly by Westphalia and Hesse Cassel, and w. by Holland. The following table shows the divisions, or landrosteien, of Hanover, with their respective areas and populations:

Landrosteien, or Provinces.	S. Area in Sq. Miles.	Population in Dec., 1858.	Chief Towns.	Population.
Hanover	2300.13	354,763	Hanover, with subs.	61,852
Hildesheim	1708.56	360,801	Hildesheim	16,300
Lüneburg	4293.45	358,701	Lüneburg	12,600
Stade	2595.60	288,975	Stade	6,000
Osnabrück	2388.33	258,797	Osnabrück	12,800
East Friesland, or Aurich	1144.08	189,068	Aurich	4,792
Clausthal, and Mines of Goslar	241.92	32,946	Clausthal	14,000

In 1858 the area was accordingly a little over 14,670 sq.m.; pop. 1,844,976. Area of the Prussian province of Hanover, 14,800 sq.m.; pop. '75, 2,018,868.

Physical Character, etc.—The general physical character of Hanover is that of an extended plain with slight undulations, but in the s. the country is mountainous, embracing a considerable part of the Harz, together with the lesser heights of the Eichsfeld, Sollinger, Süntel, Deister-Oster, and Hildesheimer-Wald. From the base of these hills to the sea-coast, the land is one vast plain, only interrupted at certain points by low ranges of hilly ground. The mountains, which abound in minerals, are covered with dense woods, and the valleys lying between them are fertile and well adapted to agriculture, but beyond these valleys the country is traversed from e. to w. by a sandy tract from 50 to 80 m. in width, known as the Lüneburg heath, in which the inhabitants with difficulty gain a scanty subsistence by rearing sheep and keeping bees. Great marshes or peat-moors cover the n. and n.w. districts, but these have in some parts been so successfully drained that they yield good pasture, although the soil generally is unproductive, comprising some of the poorest districts of Germany. The coasts are low, and require to be protected from the overflowing of the sea by embankments and dikes, the land being in many parts below the ordinary level of the sea. Along the banks of the rivers there are fertile districts, even in the n. of the country.

The principal rivers are, the Elbe, which forms 120 m. of the n.e. boundary-line; the Weser, on whose affluent the Leine, the capital of Hanover, is situated; the Aller, the Ems, and the Vechte, which all fall into the German ocean. There are numerous small lakes in Hanover. The principal canals are those between Lingen and Meppen, Aurich and Emden, and the Bremen canal, between the Hamme and the Swinge, which serves to drain the moors, and to transport the turf and peat which they yield.

Climate.—The climate is moist near the ocean, and fogs and heavy winds are frequent; in the s. it is dry and colder; and in some parts of the country marsh fevers prevail, although the general character of the climate in Hanover may be characterized as healthy. The mean annual temperature is 46°5; winter 28°7; and summer 64°5. Extremes are rare. The average annual fall of rain is 23 in.

Soil, Products.—The soil is generally of inferior quality, although it varies considerably in different districts. Agriculture is in a very backward condition, and notwithstanding some improvements which have been made of late years, large tracts of land, which are well adapted for cultivation, lie waste in every part of the country. The great subdivision of the land, and the consequent absence of capital, are the main causes of this imperfect mode of agriculture. The following proportions are given by Marcard for the distribution of the land in Hanover: Arable, meadow, and garden land, 5,833,000 morgen (the morgen is 0.6310 acre); forests, 2,242,000; waste lands, 6,514,000.

The richest corn-growing districts are Hildesheim, Göttingen, and Kalenberg, and the marsh-lands near the Elbe and Weser; rye is grown for the purpose of making bread, and largely used by the rural population. The turf obtained from the peat-moors in the n. and n.w. districts constitutes the only kind of fuel used in some parts of the country, and is obtained and consumed in very large quantities. Cattle, horses, and geese are extensively reared in East Friesland and the marshlands; and barley and oats are raised in sufficient quantity for exportation.

The Lüneburg and other extensive heaths afford good sheep-walks; and when the heather is in blossom, are resorted to by the keepers of bees, who tend their hives with much care and considerable success. In 1869 there were 213,870 hives, chiefly in the Lüneburg district, yielding honey to the value of £40,000. During the same year, it was estimated that there were in Hanover 212,905 horses (upwards of 4,000 stallions); 863,362 horned cattle; 2,156,920 sheep (of which 244,000 were merinos); 572,366 swine, and 158,203 goats. In East Friesland, large flocks of geese are reared; the flesh of which is salted and exported; while large quantities of butter and cheese are annually exported from the same localities.

The rivers and lakes of Hanover yield an abundance of fish, and there are upwards of 2,500 well-stocked fish-ponds in the kingdom. Salmon is obtained in large quantities in the Weser. The herring-fishery is principally carried on from Emden, whence it is

prosecuted with considerable enterprise, the boats going not unfrequently as far as the coasts of Scotland. The forests on the Harz mountains and their offshoots yield large quantities of wood, chiefly pine and oak, while the valleys grow tobacco and some good fruits. The mineral resources of Hanover are rich and varied, including iron, copper, silver, lead, sulphur, zinc, coal, cobalt, vitriol, alum, arsenic, lime, gypsum, marble, pipe-clay, kaolin, freestone, slate for tiles, salt, obtained from 18 works, etc. In 1875 the annual production of some of the chief minerals were estimated as follows: Iron, 2,682,100 cnt. (1 centner = 100 lbs.); lead, 169,000 cnt.; salt, 1,092,000 cnt.; coal, 2,300,000 cnt. About one-third of the iron and one-fourth of the salt are obtained from the mines of the state, and it is estimated that 35,000 persons are employed in the different mining operations of Hanover.

Commerce, etc.—The trade, which has undergone some augmentation since Hanover joined the German Zollverein (q.v.) in 1854, is still very unimportant and undeveloped notwithstanding the numerous favorable conditions presented by the navigable rivers of the Hanoverian states, their good ports, well-kept high-roads, and extended railways. Besides mining, agriculture, and the rearing of cattle and other animals, the chief branches of industry are sugar-refineries, and the manufacture of tobacco, paper, hemp, thread and linen, leather, bricks, pipes, etc.

The exports consist mainly of mineral products coarse linens and canvas, honey and wax, feathers, wood, wool, horses, cattle, wheat and rye, butter, hops, rape and linseed, oil-cakes, hams, and sausages. The imports comprise English manufactured goods, colonial products, wine and spirits, and silk. Emden is the principal trading port, but the chief sea-trade of the country is effected through Hamburg and Bremen, while Hanover has an extensive commission and transit business with Leipsic and Frankfort-on-the-Main. Besides Emden, Pappenberg, Harburg, Lehe, and Leer, are rising into some note as trading ports. Hanover has good high-roads, and its postal system is well organized. The length of its post and high-roads is estimated at upwards of 3,800 m., and that of the lines of railway in operation (in the year 1875) at 660 miles. The telegraph lines are about 700 m. in extent.

Revenue.—The revenue amounted, according to the budget for 1861–62, to 19,588,322 thalers (the thaler = 2*s.* 10¾*d.*), while the expenditure for the same year was 19,763,941 thalers. The national debt had risen, in 1861, to 46,344,836 thalers, including a debt for railways of 30,623,075 thalers.

Army.—The army numbered nearly 27,000 men. The service was for a period of 7 years, the last year's service, however, being limited to the reserved corps. The principal fortresses are those of Stade, Harburg, and Fort-William, in the harbor of Bremen. Hanover furnished 15,230 men to the German confederation, and had 4 votes in the plenum, or full council of the diet.

Religion, Education, etc.—The population of Hanover, in 1871, was 1,964,527. Of these there were—Protestants, 1,713,711; Roman Catholics, 233,809; different Christian sects, 3,284; Jews, 12,799. Religious matters are under the direction of Lutheran (evangelical) and reformed consistories at Hanover, Stade, Otterndorf, Aurich, Hadeln; the see of Osnabrück, which is held alternately by a Roman Catholic and a secular Protestant bishop; and the Roman Catholic see of Hildesheim. Hanover, like other countries of northern Germany, is amply provided with educational institutions. It has one university at Göttingen, 17 high and 13 lower gymnasia, 5 normal and 21 polytechnic schools, a military academy at Hanover, a "Foundation Padægogium" at Hefeld, schools of surgery and midwifery, of which that at Celle is the most esteemed, schools for the blind, deaf and dumb, and about 3,600 free parish schools, which are in most cases dependent upon the local church party, whether Protestant or Catholic. There are also several good mining and forest schools in different parts of the kingdom.

The poor are provided for partly by voluntary subscription and partly by the proceeds of their own labor in the poor-houses erected for the reception of persons in want. There are partially self-supporting reformatories at Emden and Celle, while Hanover, Hameln, Göttingen, Lüneburg, Emden, and Hildesheim have all their separate houses of detention and poor-houses.

Law.—The administration of the law was presided over by a special ministry. Criminal cases have, since 1848, been tried before sworn juries.

Constitution, Government.—Hanover was a sovereign kingdom from 1814 to 1866. The monarchy was hereditary in the male line, and the administration was conducted by a responsible ministry with two representative chambers, whose concurrence was essential to the exercise of certain prerogatives of the crown. The upper of the two chambers consisted of the princes of the blood-royal; several mediatized princes; and other members of the higher nobility; four members nominated by the king; and fifty other members. Half the number of the elected representatives retired every third year. The lower chamber consisted of 2 of the members of the ministry nominated by the king, 2 deputies appointed by the chamber itself, 38 representatives of towns and boroughs, and 44 members for the country districts. There were, moreover, 7 provincial assemblies, whose concurrence and assent were necessary for the promulgation of laws and the levying of taxes within their several districts.

The highest department of the government was the council of state. The cabinet, which, after 1848, was composed of responsible members, comprised 7 ministers, each

of whom presided over a special department of the administration. The chambers were summoned every 2 years, but the diet or landtag was septennial. The monetary system, and the weights and measures of Hanover, were the same as those adopted by the German Zollverein (q.v.).

People.—The Hanoverians are a mixed race; those inhabiting the north-eastern and central provinces are mostly Saxons, but those on the coast are of Frisic origin; those on the west of the Ems, Dutch; and those in the southern provinces, Thuringians and Franconians. Platt-Deutsch, or low German, is commonly spoken in all the rural districts excepting those bordering upon the Netherlands, in which Dutch is the ordinary form of speech; while high German, as in every other part of Germany, is the language of the educated and higher classes.

History.—The country at present included in the kingdom of Hanover was occupied in remote ages by Saxon tribes, which, after a long-continued struggle under their leader Witikind, submitted to the dominion of Charlemagne, and embraced Christianity. Hanover continued to form part of the Frankish empire until the time of the emperor Ludvig the German, when Ludolf of Meissen incorporated it in the duchy of Saxony. In 951 the emperor Otho I., who had inherited Saxony from his father, Henry I., the hereditary duke, bestowed it on Hermann Billing, on the extinction of whose family in 1106, it passed to Lothaire of Supplinburg. By the marriage of Lothaire with Richenza of Nordheim, new territories were added to the duchy, which passed to the family of the Guelphs through their descendant Gertrude, who married Henry the proud, of Bavaria. Henry the lion, the son of the latter, did much to advance the civilization and commerce of his subjects by conferring rights and privileges upon various towns which had advocated his cause; but when he fell under the ban of the empire, a period of anarchy and confusion succeeded, which at first threatened the ruin of the country. When Henry lost the duchy of Saxony, he retained his hereditary lands of Brunswick and Lüneburg through the special favor of the emperor.

The reformation early found adherents among the burgher and rural populations of Hanover; but as the new doctrines were strongly opposed by many of the chief magistrates and the majority of the nobles, their formal introduction was made the subject of violent altercations between the opposite parties, until the conversion of Ernest I. of Lüneburg in 1535 gave support and stability to the cause of Protestantism.

The line of Brunswick-Lüneburg began with William the younger, who, in the partition which he and his elder brother Henry (the founder of the reigning Brunswick house) made of the dominions of their father, Ernest I., obtained in 1569 the duchies of Lüneburg and Celle (Zell). William died in 1592, leaving seven sons, who, with a view of avoiding the further dismembering of their patrimony, agreed that the eldest should succeed, but that one only of their number should marry. The lot of marriage fell upon the sixth brother, George, who died in 1641, in the reign of his fourth brother, duke Frederick, the last survivor of the family. On the death of Frederick in 1648, Christian Lewis, the eldest son of duke George, succeeded his uncle, and in accordance with the family compact, took, as his portion of the inheritance, Lüneburg, Grubenhagen, Diepholz, and Hoya, with Celle for his residence; while his next brother, George William, obtained Kalenburg and Göttingen, with Hanover for his residence, and thus gave origin to the lines of Celle and Hanover, which were again merged in one after the death of duke George William, third son of duke George, who, dying without male heirs, was succeeded by his kinsman and son-in-law, the elector, George Lewis of Hanover, who ascended the throne of England as George I. (q.v.) on the death of queen Anne in 1714, as the nearest Protestant heir of the deceased sovereign, being son of the electress, Sophia, daughter of Elizabeth, queen of Bohemia, and grand-daughter of James I. of England. Duke George William of Celle deserves notice for his warlike and active administration, and for the part which he took in all the momentous affairs of his age; thus he sent auxiliaries to Venice, to aid the republic against the Turks, cooperated with the duke of Brunswick to reduce his insurgent capital; entered into an alliance with the emperor against France and Sweden; sent an army into Hungary to resist the Turks; and in 1688 lent troops and money to William of Orange against James II. of England.

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prosecuted with considerable enterprise, the boats going not unfrequently as far as the coasts of Scotland. The forests on the Harz mountains and their offshoots yield large quantities of wood, chiefly pine and oak, while the valleys grow tobacco and some good fruits. The mineral resources of Hanover are rich and varied, including iron, copper, silver, lead, sulphur, zinc, coal, cobalt, vitriol, alum, arsenic, lime, gypsum, marble, pipe-clay, kaolin, freestone, slate for tiles, salt, obtained from 18 works, etc. In 1875 the annual production of some of the chief minerals were estimated as follows: Iron, 2,682,100 cnt. (1 centner = 100 lbs.); lead, 169,000 cnt.; salt, 1,092,000 cnt.; coal, 2,300,000 cnt. About one-third of the iron and one-fourth of the salt are obtained from the mines of the state, and it is estimated that 35,000 persons are employed in the different mining operations of Hanover.

Commerce, etc.—The trade, which has undergone some augmentation since Hanover joined the German Zollverein (q.v.) in 1854, is still very unimportant and undeveloped notwithstanding the numerous favorable conditions presented by the navigable rivers of the Hanoverian states, their good ports, well-kept high-roads, and extended railways. Besides mining, agriculture, and the rearing of cattle and other animals, the chief branches of industry are sugar-refineries, and the manufacture of tobacco, paper, hemp, thread and linen, leather, bricks, pipes, etc.

The exports consist mainly of mineral products coarse linens and canvas, honey and wax, feathers, wood, wool, horses, cattle, wheat and rye, butter, hops, rape and linseed, oil-cakes, hams, and sausages. The imports comprise English manufactured goods, colonial products, wine and spirits, and silk. Emden is the principal trading port, but the chief sea-trade of the country is effected through Hamburg and Bremen, while Hanover has an extensive commission and transit business with Leipsic and Frankfort-on-the-Main. Besides Emden, Pappenberg, Harburg, Lehe, and Leer, are rising into some note as trading ports. Hanover has good high-roads, and its postal system is well organized. The length of its post and high-roads is estimated at upwards of 3,800 m., and that of the lines of railway in operation (in the year 1875) at 660 miles. The telegraph lines are about 700 m. in extent.

Revenue.—The revenue amounted, according to the budget for 1861–62, to 19,588,322 thalers (the thaler = 2*s.* 10½*d.*), while the expenditure for the same year was 19,763,941 thalers. The national debt had risen, in 1861, to 46,344,836 thalers, including a debt for railways of 30,623,075 thalers.

Army.—The army numbered nearly 27,000 men. The service was for a period of 7 years, the last year's service, however, being limited to the reserved corps. The principal fortresses are those of Stade, Harburg, and Fort-William, in the harbor of Bremen. Hanover furnished 15,230 men to the German confederation, and had 4 votes in the plenum, or full council of the diet.

Religion, Education, etc.—The population of Hanover, in 1871, was 1,964,527. Of these there were—Protestants, 1,713,711; Roman Catholics, 233,809; different Christian sects, 3,284; Jews, 12,799. Religious matters are under the direction of Lutheran (evangelical) and reformed consistories at Hanover, Stade, Otterndorf, Aurich, Hadeln; the see of Osnabrück, which is held alternately by a Roman Catholic and a secular Protestant bishop; and the Roman Catholic see of Hildesheim. Hanover, like other countries of northern Germany, is amply provided with educational institutions. It has one university at Göttingen, 17 high and 13 lower gymnasia, 5 normal and 21 polytechnic schools, a military academy at Hanover, a "Foundation Padægogium" at Hefeld, schools of surgery and midwifery, of which that at Celle is the most esteemed, schools for the blind, deaf and dumb, and about 3,600 free parish schools, which are in most cases dependent upon the local church party, whether Protestant or Catholic. There are also several good mining and forest schools in different parts of the kingdom.

The poor are provided for partly by voluntary subscription and partly by the proceeds of their own labor in the poor-houses erected for the reception of persons in want. There are partially self-supporting reformatories at Emden and Celle, while Hanover, Hameln, Göttingen, Lüneburg, Emden, and Hildesheim have all their separate houses of detention and poor-houses.

Law.—The administration of the law was presided over by a special ministry. Criminal cases have, since 1848, been tried before sworn juries.

Constitution, Government.—Hanover was a sovereign kingdom from 1814 to 1866. The monarchy was hereditary in the male line, and the administration was conducted by a responsible ministry with two representative chambers, whose concurrence was essential to the exercise of certain prerogatives of the crown. The upper of the two chambers consisted of the princes of the blood-royal; several mediatized princes; and other members of the higher nobility; four members nominated by the king; and fifty other members. Half the number of the elected representatives retired every third year. The lower chamber consisted of 2 of the members of the ministry nominated by the king, 2 deputies appointed by the chamber itself, 38 representatives of towns and boroughs, and 44 members for the country districts. There were, moreover, 7 provincial assemblies, whose concurrence and assent were necessary for the promulgation of laws and the levying of taxes within their several districts.

The highest department of the government was the council of state. The cabinet, which, after 1848, was composed of responsible members, comprised 7 ministers, each

of whom presided over a special department of the administration. The chambers were summoned every 2 years, but the diet or landtag was septennial. The monetary system, and the weights and measures of Hanover, were the same as those adopted by the German Zollverein (q.v.).

People.—The Hanoverians are a mixed race; those inhabiting the north-eastern and central provinces are mostly Saxons, but those on the coast are of Frisic origin; those on the west of the Ems, Dutch; and those in the southern provinces, Thuringians and Franconians. Platt-Deutsch, or low German, is commonly spoken in all the rural districts excepting those bordering upon the Netherlands, in which Dutch is the ordinary form of speech; while high German, as in every other part of Germany, is the language of the educated and higher classes.

History.—The country at present included in the kingdom of Hanover was occupied in remote ages by Saxon tribes, which, after a long-continued struggle under their leader Witikind, submitted to the dominion of Charlemagne, and embraced Christianity. Hanover continued to form part of the Frankish empire until the time of the emperor Ludvig the German, when Ludolf of Meissen incorporated it in the duchy of Saxony. In 951 the emperor Otho I., who had inherited Saxony from his father, Henry I., the hereditary duke, bestowed it on Hermann Billing, on the extinction of whose family in 1106, it passed to Lothaire of Supplinburg. By the marriage of Lothaire with Richenza of Nordheim, new territories were added to the duchy, which passed to the family of the Guelphs through their descendant Gertrude, who married Henry the proud, of Bavaria. Henry the lion, the son of the latter, did much to advance the civilization and commerce of his subjects by conferring rights and privileges upon various towns which had advocated his cause; but when he fell under the ban of the empire, a period of anarchy and confusion succeeded, which at first threatened the ruin of the country. When Henry lost the duchy of Saxony, he retained his hereditary lands of Brunswick and Lüneburg through the special favor of the emperor.

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wars against the French republic, but the expenses of their maintenance were defrayed by England; and it was not till 1801, when Prussia, refusing to acknowledge the neutrality of Hanover, threw troops into the electorate, that Hanover suffered from the consequences of the anomalous position in which its relations to England placed it in regard to the other states of Germany. The Prussian troops evacuated Hanover at the close of the same year, in accordance with the treaty entered into between France and England; but the claims and counter-claims which arose from this occupation, gave rise to protracted discussions, which were not finally settled till 1830, when it was stipulated by treaty that Hanover was to pay to Prussia an indemnity of 375,000 thalers. In 1803, when war was renewed between England and France, Napoleon threw an army, under the command of Mortier, into Hanover, and the result of this measure was to compel the Hanoverian government to enter into a convention with the French gen., by which it bound itself to abstain from serving against France during the pending war; to give up fortresses, arms, and horses to the army; to subsidize French troops; and to participate unconditionally in the general costs of the war. A large number of the army, however, having contrived to evade signing these articles of surrender, went over to England, where the men were incorporated into the German legion, which did good service both in the Peninsular war, and in the Belgian campaign of 1815, which terminated in the battle of Waterloo. In 1806 Napoleon, after having ceded Hanover to Prussia, and again withdrawn it, appropriated a portion of the electorate to complete the newly-formed kingdom of Westphalia, which in 1810 received the whole of the Hanoverian territory. Finally, Hanover was united with France, and the n.w. portion divided into the departments of Bouches de l'Elbe, Bouches du Weser, and Leine, while the s.e. portions formed the Westphalian departments of Atter and Harz. After the expulsion of the French, Hanover was elevated to the rank of a kingdom in 1814. In the same year, the prince Regent of England convoked the Hanoverian states to deliberate upon the best manner of consolidating the various independent governments of the different provinces into one systematic whole. In 1816 the duke of Cambridge, the brother of the prince regent, was appointed governor-general of Hanover; and in 1819 a new constitution was granted, in accordance with which the provincial states were retained and enlarged, and two representative chambers associated with them. Very little was done in the time of George IV. towards the amelioration of the administration, and the general disaffection and distrust had risen to the highest pitch, when William IV. ascended the throne. The influence of the French revolution of July (1830) extended to Hanover, and in 1831 disturbances broke out at Osterode and Göttingen. These were speedily put down, but as the national discontent did not abate, the prime minister, count Munster, who had long been obnoxious to the mass of the people, was dismissed, and the duke of Cambridge, who had hitherto acted as governor-general, invested with the title of viceroy, and intrusted with very extensive powers. The duke recommended gradual reforms, but as the popular feeling was decidedly in favor of a thoroughly re-modeled constitution, the states were again convoked; and finally, in 1833, a draft of the proposed constitution, which had been prepared by a commission appointed by the ministry and the states, was laid before William IV., and after it had been considerably modified in England, it received his signature, Sept. 26, 1833, without having been again submitted to the assembly of the states. The death of William IV., in 1837, placed Hanover under the rule of the next male heir, Ernest August, duke of Cumberland. One of the first measures of the new king was to abrogate the constitution of 1833, to which he had from the time of its adoption refused to give his assent and to restore that of 1819.

When the government demanded the oath of allegiance from all persons holding office under the state, seven of the Göttingen professors—viz., Dahlmann, Gervinus, J. Grimm, F. Grimm, Ewald, Albrecht, and W. Weber—refused to take the required oath, in consequence of which all were deprived, without any preliminary investigation, of their chairs, and the three first-named banished from the country.

From this period till 1848, when the success of the French revolution compelled the German rulers to adopt a more liberal policy towards their subjects, the king showed himself resolutely averse to sanction reform. Liberal measures, however, were at length introduced, and the new constitution of 1848 was more liberal than that of 1833. The king, moreover, organized some useful reforms in the internal administration, and effected great improvements in several of the towns.

The chambers of Hanover showed great zeal in the reorganization of Germany, and king Ernest entered into a triple alliance with Prussia and Saxony, to promote the unity of the German nation. Unlike many of his German contemporaries, king Ernest kept the promises which he had made to his people during the revolutionary crisis of 1848-49; and although the nobility made the most pressing appeals to him for the recovery of their ancient privileges, and the overthrow of the constitution, he refused to withdraw his pledge that the country should be governed in accordance with constitutional principles; and such confidence was placed in his word, that, notwithstanding his avowed opinions, his death, in 1851, was regarded as a serious blow to the cause of reform, for his son and successor, George V., was known to hold very extreme views in regard to the kingly power and the claims of the aristocracy. The early measures of the new king were not calculated to allay the fears entertained of his policy; but the decisive declaration of the

assembly of the states that they were desirous of seeing the reforms completed which had been begun by the late king, and their vote of want of confidence in the new cabinet, prevented any marked retrogressive movement on the part of the ministry, and in 1854 Hanover joined the Zollverein. In 1855 the constitution underwent various modifications in accordance with the demands of the federal diet, by which it was made to approximate more closely to that of 1840. Although the changes were unpopular, they met with no energetic opposition. After the war of 1866 Hanover became a province of Prussia. See GERMANY.

HANOVER, a t. in Jefferson co., Ind., near the Ohio river, 6 m. w.s.w. of Madison; pop. of township, 1399. It is the seat of Hanover (Presbyterian) college, founded in 1833.

HANOVER, a t. in New Hampshire, United States, pleasantly situated on the e. bank of the Connecticut river, 52 m. n.w. from Concord. It is the seat of Dartmouth college, founded by lord Dartmouth for the education of the Indian youth, and a medical college. Pop. of township ('70), 2,085.

HANOVER (Ger. *Hanno'ver*), formerly capital of the kingdom, now chief t. of the province of Hanover, is situated on a plain lying on both banks of the Leine—which is crossed by ten bridges, and is navigable hence to the ocean—about 100 m. s.s.w. of Hamburg. It consists of the old town, and the suburbs Glocksee and Linden, and with these inclusive, it had, in 1871, a pop. of 104,248. The older parts of the city are mean and unattractive, but since 1837, when by the accession of Ernest-Augustus, duke of Cumberland, to the throne, it became the residence of the sovereign, Hanover has undergone very extensive alterations and improvements. In the Waterloo Platz, with its column surmounted by a figure of Victory, are the fine new barracks and arsenal. Besides these the most interesting buildings are the stately town-hall in the market-place, founded in 1439, with an adjacent public library of 40,000 volumes; the royal library, with its 150,000 volumes and 2,000 MSS., its incunabula, archives, and valuable state papers; the theater, one of the largest in Germany; the king's palace; the museum, with good natural-history collections; a gallery of pictures, etc.; and the royal state palace, built on the site of a monastery of Minorites in 1632, which deserves notice for the magnificence of its internal decorations, and for the number and value of the objects of ancient and modern art which it contains; its fine gallery of paintings; its chapel, in which are preserved numerous relics and antiques, many of which were brought from Palestine by Henry the Lion in 1172; and an altar-piece by L. Cranach. Among the charitable institutions of H. are the orphan asylum, school for the blind, infirmaries, hospitals, and poor-houses, the latter of which are principally supported by private subscription. Hanover is well provided with educational institutions, the most noteworthy of which are the Georgianum, a collegiate school for the sons of noblemen; a lyceum, and a gymnasium. The city has also polytechnic, normal, and medical schools, and 25 free public schools. Hanover was the first place in Germany that was lighted with gas (in 1826). The discovery of a rich bed of asphalt in the neighborhood of the town has been the means of giving the streets better side-pavements than most other German towns possess, while the recent improvements that have been effected in the old system of sewers, which dates from the 16th c., render the drainage particularly good. Hanover has gained pleasant walks and pleasure-rounds by the leveling and planting of the ramparts, while in the immediate vicinity of the town lie the royal palaces of Herrenhausen and Montbrillant, whose beautiful grounds and gardens are freely opened to the public.

Since Hanover became a center of the North German railway system, its manufactures have greatly increased in importance. Amongst the foremost are the manufactures of cotton, wax-cloth, machinery, locomotives; also gold, silver, and bronze wares, chemicals, leather, and tobacco. The trade of the place has also rapidly developed of late years.

See Leutsch, *Ein Blick auf die Geschichte H.* (1827); Kobbe, *Abriss einer Geschichte d. Königreichs H.* (1823); Bülow, *Beiträge zur Gesch. d. braunschwluneb.-landes* (1829); Stieler's *Atlas* (1861); Tiries, *Hannover und Umgegend* (1874).

HANOVER COURT-HOUSE, Battle of. See Chickahominy.

HANSARD, a well-known name in connection with the printing of the British parliamentary records. The first of the family was Luke Hansard, who was born in 1752 at Norwich, and coming to London, worked for some years as compositor in the office of Hughes, the printer to the house of commons; and in 1800 succeeded Hughes as sole proprietor of the business, which is still carried on by his family. Competition and other causes have led to a division of the parliamentary printing, but the Messrs. Hansard still print the bills before parliament, the reports of committees, and some of the accounts.

The name of Hansard is connected with an important question of parliamentary privilege. The case was briefly as follows: A bookseller named Stockdale brought an action for libel against the Messrs. Hansard, the libel consisting of statements in the parliamentary reports which the latter had printed, and lord chief-justice Denman decided in favor of Stockdale. The house of commons complained of a breach of privilege, and another action was raised in the court of queen's bench, but, as before, the plea of *the orders and privileges of the house* was overruled. After a third action had been brought, with

a similar result, an act of parliament was passed, directing that any proceedings against persons for publication of papers printed by order of either house of parliament are to be stayed by the courts of law, upon delivery of a certificate and affidavit that such publication is by order of either house.

The Hansards are, however, most widely known by the reports of the debates in parliament, which are published by them and bear their name. When charges of inconsistency are made in parliament, they are usually verified by a quotation from *Hansard*, the accuracy of which is seldom or never disputed. An opinion, in consequence, widely prevails that the Messrs. Hansard retain a corps of parliamentary shorthand writers in their service, from whose reports the debates printed in their work are prepared. This popular impression is entirely erroneous. The speeches printed in *Hansard* are taken in the gross from the London morning newspapers. They are usually sent to the peers or members by whom they are spoken for revision and correction, and many important alterations, expurgations, and additions are made in the speeches thus revised, when a speaker has been led away by the heat of debate, or has, on the other hand, failed to say all that was in his mind when he rose. The convenience, however, of possessing some record more or less authentic of parliamentary proceedings has led the executive government to take a certain number of copies of *Hansard* for distribution among the public offices and departments. Many peers and members of parliament, foreign governments, and public libraries, also subscribe to this work, which is issued at a certain fixed price, which the Messrs. Hansard guarantee, at the commencement of each session, shall not be exceeded.

HANSEATIC LEAGUE, THE, or THE HANSA, was a trade-union established in the 13th c. by certain cities of Northern Germany for their mutual safety, and for the protection of their trade, which at that period was exposed to the rapacity of rulers, and the lawless attacks of marauders on land and pirates at sea; yet, notwithstanding obstacles such as these, and the heavy imposts levied on the German traders by their princes, several towns of Northern Germany, as, for instance, Hamburg, Lübeck, and Bremen, had acquired some commercial importance as early as the 11th century. The fame of the rich cargoes that found their way into their factories had given rise to swarms of pirates, who infested the mouths of the Elbe and the outlets to the Baltic; and the necessity which the neighboring ports felt of protecting themselves effectually from such troublesome enemies led, in 1219, to the settlement of a compact between Hamburg, Ditmarsh, and Hadeln, to protect the course of the river and the adjacent sea. This agreement was followed two years later by a treaty of mutual aid and defense between Hamburg and Lübeck, which was joined, in 1247, by the town of Brunswick; and thus was formed the German league, or Hansa, the name of which indicated, in the Platt-deutsch of the traders, a bond or compact for mutual aid. The progress of the league was so rapid that, before the year 1260, when the first diet met at Lübeck, which was the central point of the whole association, it had its regularly organized government, with a fixed system of finance and administration.

The entire league, which at one period numbered 85 towns, and included every city of importance between Holland and Livonia, was divided into four classes or circles: 1. The Vandal or Wendic cities of the Baltic; 2. The towns of Westphalia, the Rhineland, and the Netherlands; 3. Those of Saxony and Brandenburg; 4. Those of Prussia and Livonia. The capitals of the respective circles were Lübeck, Cologne, Brunswick, and Danzig.

The cities composing the league were represented by deputies at the general diet, which met every three years, generally at Lübeck, which was considered as the capital of the league, to discuss and settle the current business of the league, and held an extraordinary meeting every ten years, to renew the various unions which constituted the great Hansa. The edicts of the diet were communicated to the masters of the great circles, who remitted them to the several guilds within their respective jurisdictions.

Four large foreign factories were established at London (1250), Bruges (1252), Novogorod (1272), and Bergen (1278); and besides these and the ordinary members, various cities were connected by treaties of limited alliance with the league; as, for instance, Amsterdam, Antwerp, Bordeaux, Barcelona, Cadiz, Dordrecht, Leghorn, Lisbon, Marseilles, Messina, Naples, Ostend, Rotterdam, Rouen, Seville, St. Malo.

The Hanseatic league was the first systematic trade-union known in the history of European nations, and the high political influence which it rapidly attained was due to its development of sounder principles of trade than any that had hitherto been put into practice; while in the earlier periods of its existence it exerted a beneficial action on the advance of civilization, which can scarcely be overrated. Its professed object was to protect the commerce of its members by land and by sea, to defend and extend its commercial relations with and among foreigners, and as far as possible to exclude all other competitors in trade, and firmly to maintain, and, if possible, extend, all the rights and immunities that had been granted by various rulers to the corporation. For the promotion of these ends, the league kept ships and armed men in its pay, the charge of whose maintenance was defrayed by a regular system of taxation, and by the funds obtained by the money-fines which the diet levied for infringements of its laws. In its factories, only unmarried clerks and serving-men were employed, and an almost monas-

tic discipline was enforced; but the by-laws of the league prescribed a system of daily sports and light occupations for the recreation of the men, while sensible regulations for their comfort and cleanliness, and for the celebration of festivals at certain fixed times of the year, bear evidence of the sound sense that influenced the mode of government of the Hansa, and which was further shown by the injunction to the masters of factories to avoid everything that could hurt the prejudices of the foreigners among whom they were placed, and to conform in all things lawful to the habits of the country.

For many years the Hanseatic league was the undisputed mistress of the Baltic and German ocean. It created new centers of trade and civilization in numerous parts of northern Europe, and contributed to the expansion of agriculture and other industrial arts, by opening new channels of communication by means of the canals and roads with which it connected together the members of its association. The greatest powers dreaded its hostility and sought its alliance, and many of the powerful sovereigns of the middle ages were indebted to it for the most substantial benefits.

In England, since the time of king Ethelred, German traders had enjoyed the same privileges as native-born Englishmen. Henry II. took the Cologne merchants, together with the house which they occupied on the Thames, specially under his protection, allowing to them and their successors the privilege of exporting goods free of duty, and selling their Rhenish wines for the same price at which French wines were then sold in London; and in 1261 these privileges were extended by Henry III. to all the Germans in London who had a share in the Hanseatic factory, or *Aula Teutonicorum*, which was long known to Londoners as the "steelyard." In 1338 the Hansards gained the goodwill of Edward III. by supplying him with the money necessary to redeem the regalia and coronation jewels of his queen, which he had pledged to Cologne money-lenders, and by allowing him to draw upon their houses for large sums with which to defray the cost of his French wars. Their relations to other sovereigns at that period were equally significant of their power, for they defeated kings Eric and Hakon of Norway, and king Waldemar III. of Denmark, in 1348, deposed Magnus of Sweden, and bestowed his crown upon duke Albert of Mecklenburg; and in 1428 equipped a fleet of 248 ships, carrying 12,000 soldiers, against Eric of Denmark.

With the 15th c. the league reached at once its culminating point and its decline, for in proportion as the seas and roads were better protected by the states to which they belonged, and rulers learned to comprehend the commercial advantages of their dominions, its supremacy declined; while the discovery of America, and of a new sea-route to India, gave an entirely different direction to the trade of Europe. The Hansa had, moreover, arrogated to itself, in the course of time, presumed rights of imposing the greater and lesser ban, and exercising acts of sovereignty and judicial power, which were incompatible with the supremacy of the rulers in whose states they were enforced, and hence the league was necessarily brought into frequent hostile collision with the local authorities. Thus, in accordance with their system of exclusive policy, the Hansards refused to grant to merchants trading in foreign parts the same privileges in the Hanseatic cities which they themselves had enjoyed for centuries in England, Russia, and Scandinavia, and hence arose dissensions, which not unfrequently ended in a fierce maritime warfare. By way of retaliation for the pertinacity with which the league refused to grant to the English the same immunities which had been accorded to traders of other nations, parliament required that Germans should pay the tax on wool and wine, which was exacted from all other foreigners in the English markets; and although the Hansards strongly resisted, they were at length condemned by the courts, in 1469, to pay a fine of £13,500; and they would probably have lost all they possessed in England, if their cause had not been advocated by Edward IV., who had more than once been indebted to them for money and aid, and who in 1474 secured for them, by a clause in the treaty of Utrecht, a restitution of nearly all their former rights in England. In 1598 their obstinate pertinacity in insisting upon the maintenance of their old prerogatives, notwithstanding the altered condition of the times, drew upon them the anger of queen Elizabeth, who dispatched a fleet under Drake and Norris to seize upon the ships of the Hansa, of which 61 were captured, while she banished the Hansards from their factory in London. These measures had the desired effect of compelling the league to receive English traders on equal conditions, and thenceforward the Hansards were permitted to occupy the steelyard, as in olden times. The Hansa had, however, outlived its date, and at the diet held at Lübeck, in 1630, the majority of the cities formally renounced their alliance. Hamburg, Lübeck, Bremen, and, for a short time, Danzig, remained faithful to their ancient compact, and continued to form an association of free republics, that existed unchanged till 1810, when the first three were incorporated in the French empire. These, in 1813, combined with Frankfort-on-the-Main to form a union. Frankfort became Prussian in 1866; whereas at a convention in July, 1870, the powers and privileges of the three free towns were re-established and reorganized, and under the empire they still retain their local self-government. See Sartorius, *Gesch. des hanseatischen Bundes* (1802–08); Barthold, *Gesch. der deutschen Hansa* (1854); *Hansische Geschichtsblätter* (1871–77).

HANSEN, Peter Andreas, 1795–1874; a Danish astronomer; when young apprenticed to a watchmaker; afterwards employed by Schumacher, professor of

astronomy at Copenhagen, to assist in the measurement of an arc of meridian in Holstein. This led to his appointment as assistant to Schumacher, at the observatory of Altona. Hansen's reputation as a mathematician had by this time become generally known, and in 1825 he was selected to succeed professor Encke as director of the observatory of Seeberg, near Gotha. There he remained for the rest of his life, devoting his talents to the development of the highest branches of mathematical astronomy, with an originality of conception which was acknowledged by the English royal astronomical society on two occasions, by the award of their gold medal for his researches in physical astronomy and his lunar tables. His *Tables de la Lune* appeared in 1857, published at the expense of the British government, which awarded him a prize of £1000; they have been adopted for use in the calculations of the *Nautical Almanac*. In addition to this important volume containing the full details of the formulæ explanatory of his lunar theory, Hansen was the author of a large number of miscellaneous papers, principally relating to the orbits of comets and planets or to perturbational astronomy. In one of these he was the first to point out that Encke's value of the horizontal equatorial solar parallax required to be increased to reconcile the lunar theory with modern observations—an opinion which was subsequently confirmed by Le Verrier from his planetary researches and by the observations of Mars and the transit of Venus of 1874. Hansen was a foreign member of the royal society, and an associate of the royal astronomical society.

HAN'SI, a t. of the district of Hissar, in the province of the Punjab, lies 89 m. to the n.w. of Delhi, in lat. 29° 6′ n., and long. 76° 3′ e. It is watered by a branch of the Delhi canal, made in 1356 by Feroz Toghluk, and cleared in 1825 by the British government. This work, besides its domestic and agricultural uses, is available for navigation. The pop. of the town according to the latest census (1868) was 13,563.

HANSON, a co. in s.e. Dakotah traversed by the Dakotah river; 432 sq.m.; formed since 1870. The soil is fertile. Co. seat, Rockport.

HANSTEEN, CHRISTOPH, a Norwegian astronomer, was b. at Christiania, Sept. 26, 1784. At first intended for the legal profession, he subsequently devoted himself entirely to the study of mathematical science. In 1814 he was appointed to the chair of mathematics in the university of Christiania, and there, in 1819, published his celebrated work on magnetism, which was afterwards translated into German under the title of *Untersuchungen über den Magnetismus der Erde*, and produced a great sensation, especially in England, so much so, that in almost all the voyages of discovery since undertaken, magnetic observations have been made in conformity to his directions. In 1821 he discovered the "law of magnetic force." See MAGNETISM. After having visited London, Paris, Hamburg, Berlin, and different parts of his native country, he resolved to undertake a journey to Siberia, for the purpose of continuing his magnetic observations, which he accomplished from 1828 to 1830, and returned to Europe with a large collection of facts, which were of much service in aiding to dispel the obscurity which enveloped and still partly envelops this subject. On his return to Christiania, he prevailed upon the government to erect an observatory, fitted also for magnetic observations. Besides occupying his chair in the university, Hansteen was professor of mathematics in the school of artillery, superintended the triangulation of Norway, and helped in the reorganization of the national system of weights and measures. He died April 15, 1873. He published lectures on astronomy, a work on mechanics, another on geometry, and several memoirs, of which the greater part are inserted in the *Magazin for Naturvidenskaberne*.

HANTS, a co. in central Nova Scotia on Mines basin; 1175 sq.m.; pop. '72, 21,301. It has a varied surface of mountains, hills, and valleys. Gypsum abounds in great quantities. Chief town, Windsor.

HANUMÂN, or HANÛMÂN (the nominative of the Sanskrit base *hanumat* or *hanûmat*, literally meaning "having a jaw," but understood to imply "having a broken jaw"), is the name of a fabulous monkey, who plays a great rôle in the legendary history of the second or classical period of Hindu mythology. He is represented there as the strenuous friend and ally of Vishnu, when the latter, in his incarnation as Râma, made his expedition to Ceylon, in order to recover his wife Sitâ, carried off by the giant Râvana. See VISHNU. In the war between Râma and Râvana, Hanumân, on one occasion, is related to have bridged over the ocean between the continent of India and Ceylon with rocks of a prodigious size, which he and his friend threw into the sea; on another, to have set Lankâ on fire, by means of igniting his tail, previously dipped into combustible matter; and when, to restore to life his friends slain in battle by the armies of Râvana, he flew to the Himalaya, where he intended to gather the magical herbs required for his purpose, he grew impatient at not finding them quickly, and tore off the whole peak of the mountain, which he then carried to Lankâ, the capital of Ceylon. Such and many other extraordinary feats are related of this "chieftain of the monkey tribe," especially in the great poem *Râmâyana*, which is devoted to the history of Vishnu in his descent on earth as Râma, and in many of its chapters dwells with particular predilection on Hanumat the monkey. Of his origin and his first darings, the older version of this epos gives us the following account: His mother was an apsaras or nymph,

Punjikasthalá, who, through some curse, however, was born as the daughter of a monkey, and under the name of *Anjaná*, became the wife of the monkey *Kesarin*. Possessing the power of assuming whatever shape she pleased, she once transformed herself into a human being, and walked in splendid attire on the top of a mountain. There *Váyu*, the god of wind, caught sight of her, and became bewildered with love. The result of his stormy courtship, though purely ideal, as he at least explained it to her, was the child Hanumat. The later version of the *Rámáyana* adds to this story a prefatory incident to justify, as it were, the liberty which the god took with the wife of Kesarin, by making him act under the promise of a rishi or saint. When a child, Hanumân, while once lying on the lap of his mother, saw the sun rise, and thinking it was a fruit, conceived the desire of taking it. Up he started, therefore, into the air; but Indra, angry at his presumption, hurled him down with his fiery thunderbolt to the top of the mountain, where in his fall he broke his left jaw.

The numerous pictures and sculptures by which this singular Hindu deity is represented, refer to these and similar episodes of his history. He appears either in a fighting posture, armed with disk, sword, or trident, and trampling on some vanquished foe; or he is carrying the rocks with which he bridged over the sea; or he is in the attitude of a worshiper—which means of Vishnu. Frequently his figure is single; sometimes it is connected with that of garuda, the sacred bird-vehicle of Vishnu; and it is never missing in those groups which emblematically represent the principal facts of Râma's life. Those not very familiar with the meaning of Hindu idols, will never fail to recognize him by his prodigious tail.

That Hanumân is the type of the monkeys worshiped by a certain class of Hindus, requires no further remark, nor will it be necessary to say that this monkey-worship, to which so early a writer as Megasthenes bears testimony when he speaks of the numerous monkeys coming to the town Latage—probably in the north of India—and being fed there daily, has its origin in the devotion to the memory of Hanumân, that great friend of Vishnu. The foundation of the myth is probably an historical one. There is no reason to doubt tradition when it tells us that a hero—it calls him Ramâ—carried Brahmanic institutions from the north of India to Ceylon, and we may believe it also when it couples with this event a cause which transformed this expedition into a war between the Brahmanic population of India and that of Ceylon. Nor is it improbable that Ramâ, on his march to the south, formed alliances, and that his allies, on account of their barbarous condition, were compared by his followers to monkeys. There, however, all that may be real in the myth of Hanumân seems to end, for its other ingredients are either purely legendary, or represent phenomena of a physical kind. When Ramâ ceased to be the human hero, and became an incarnation of Vishnu, it followed, as a necessary consequence, that the history of all the circumstances connected with this change also became in part imaginary, and in part influenced by the character which belonged to the god. It is the latter influence which is especially perceivable in the origin ascribed to Hanumân. Vishnu is in the Vedas a deity representing attributes of the sun, and the legends of the birth of his ally are such as would originate in phenomena connected with sunrise. To this the names ascribed to his mother seem to point; for the apsarasas "were originally personifications of the vapours which are attracted by the sun, and form into mists or clouds" (see Goldstücker's *Sanskrit Dictionary* under the word "apsaras"); and *anjaná*, among other meanings, signifies night.

HANWAY, JONAS, 1712–86; an English traveler. In 1743 he became a partner with Mr. Dingley, a merchant in St. Petersburg, and in this way had his attention turned to the trade between Russia and Persia, in which latter country he traveled considerably, meeting with many misfortunes. The latter part of his life was for the most part spent in London, and his leisure was devoted to the advocacy and support of useful enterprises. He is popularly remembered as the first Englishman to carry an umbrella in his native country; this he persisted in using in spite of all the efforts of the hackney coachman to hoot or hustle him into conformity. He wrote with some effect against the custom of giving vails, or gratuities to servants; and in his *Journey from Portsmouth to Kingston* he attacked the habit of tea-drinking, which, however, found an able and ardent defender in Dr. Johnson. In 1757 he took an active part in founding the Marine society, the object of which was to fit out poor boys and men for the navy; he was one of the originators of the Magdalen hospital; it was due to his continued efforts that the act of George III. was passed for the better treatment of the parish infants; and in 1785 he took up the lamentable case of those little chimney-sweeps whose dangerous occupation is now a thing of the past. The method of solitary confinement for prisoners found in him one of its earliest advocates, and in various other ways he sought to improve the chances of the criminal population.

HAPLOMI. See ESOCIDÆ, MALACOPTERYGII, and PIKE, (*ante*).

HAP'SBURG, or **HABSBURG**, HOUSE OF, of which the imperial family of Austria are the representatives, derived its name from the castle of Habsburg, or Habichtsburg (Hawk's castle), on the right bank of the Aar, in the Swiss canton of Aargau. The castle was built in the 11th c. by Werner, bishop of Strasburg, grandson of Gunthrun the rich, count of Alsace and Breisgau, who, according to the Austrian chroniclers, was descended from Ethico I., duke of Alemannia and Alsace in the 7th century. Werner

delivered the castle to his brother Kanzeline, whose nephew, Werner II., was the first who assumed the title of count of Hapsburg. Albrecht or Albert III., the great-grandson of Werner II., assumed the title of Landgraf of upper Alsace, or Sundgau. This prince possessed a great part of Swabia, Alsace, and the Aargau, to which his son, Rudolf I., added Lauffenburg. On his death in 1232, his sons, Albert IV. and Rudolf II., divided their father's possessions—Rudolf becoming the founder of the Hapsburg-Lauffenburg line. This branch became extinct in 1408 in Germany, but is still represented in England by the Fielding family. The whole possessions of Rudolf's lineage reverted to the Austrian line in 1415. Albert IV. laid the foundation of the future greatness of the house of Hapsburg. He left three sons, the eldest of whom, Rudolf III. (Rudolf I. of Austria), succeeded him, and by appropriating the provinces which, as emperor, he had wrested from Ottocar of Bohemia—viz., upper and lower Austria, Styria, Carinthia, and Carniola—greatly increased the power of his family. His son, Albrecht or Albert I. (q.v.), succeeded in 1291 to the family possessions. The further history of the house of Hapsburg may be traced in that of Austria (q.v.). It may be noted here that Ernest, surnamed the iron, one of the sons of Leopold II., and founder of the Styrian line, married Cymburga, daughter of Ziemovitz, duke of Masovia (now province of Warsaw), and niece of Uladislas Jagellon, king of Poland, celebrated in Austrian history not only for her beauty and accomplishments, but also for her great strength of body, of which latter quality some historians give remarkable instances. From her are said to be derived the thick lips which are a characteristic feature of the Austrian family.

Compare prince Lieknowski, *Geschichte des Hauses Habsburg* (2 vols. Wien, 1836–37), also Coxe's *House of Austria.*

HARAFORA, or ALFOOROO, a tribe of savages in the island of Celebes and also in Papua or New Guinea, somewhat resembling the Malays, but having crisp instead of straight hair. They clothe themselves with the inner bark of trees made flexible by pounding. The fighting men are armed with shields and cleavers. One of their barbarous customs prescribes that a young man shall not marry until he has cut off a human head; the order of importance being—first, a man's head, then that of a woman, and lastly, a child's; but the greatest trophy is the head of a white man. The result of this butchery is that in some places the skulls accumulated through this custom far outnumber the people living. They have some traditions of a god, and of a religion derived probably from the Mohammedans. They live in the most primitive huts, and have no considerable village.

HÁRA-KIRI (see HARRI-KARI, *ante*). From *hara,* belly, and *kiri,* to cut. The Japanese method of suicide for men only, women never using this method. With the abolition of the custom of wearing two swords, hara-kiri is rapidly falling into desuetude, and is practiced only in rare cases. The object of hara kiri was to sever the large artery in front of the spine, and thus secure speedy death.

HARALD I. (surnamed HAARFAGER, or beautiful-haired), king of Norway (863–930), was a descendant of the ancient race of the Ynglings in Sweden, and the son of Halfdan Svarte, a powerful jarl in Norway, who is noted as the earliest lawgiver of his country. According to the popular saga, Harald was induced to attempt the subjugation of the whole of Norway, through his love to a high-born maiden, named Gyda, who declared that she would not be his wife until he was sole king of Norway; and he swore that he would neither cut nor comb his hair till he had subdued all the land to his sway—an oath which he kept. After many years' contest with his brother jarls, he finally reduced the whole of the country from Finmarken to the Naze of Norway; and after defeating the last general confederacy of the independent Norwegian chieftains in a naval battle at Hafursfjord, the present Stavengerfjord, he remained sole ruler of the land (872). Previously to his reign, Norway, like the other Scandinavian countries, had been divided into numerous independent districts or tribes, governed by their several kings. Harald, however, replaced all these rulers by jarls of his own, under whom were placed herser or bailiffs, to whom was committed the charge of seeing that the tax which was imposed over all the land was faithfully paid. Harald's severity compelled the deposed rulers to seek other homes; and his reign is memorable for the many new settlements which were made by these exiles. Thus, the Orkneys were settled by the fugitive Ejnar, the son of the king's friend, Rognvald, jarl of More; while another son, Ganger Rolf, who had incurred Harald's anger by repeated acts of piracy, sailed with his followers in 876 to France, where he founded the Norman power. Other exiled Norwegian jarls or kings colonized the Hebrides, Shetland, and Faröe islands, and Iceland, whence they continued their customary sea-roving and plunders until these islands, with the exception of Iceland, were subdued by Harald. Although a barbarian, he ruled with a sound policy in advance of his age, and by his firmness succeeded in suppressing for the time the private warfare and sea-piracy which had prevailed in Norway before his reign; but the dissensions of his numerous sons checked all the good that might have resulted from his measures. To restore concord in his family, he divided his dominions among his children, reserving only the supreme power to himself. He died in 933 at Trondheim, which he had made his capital, and was succeeded by his son, Eric Blodöxa, or the Bloodaxe, to whom he had three years before resigned the government.

HARALD III. (surnamed HAARDRAADE, or double beard), king of Norway (1047–67), was the son of Sigurd, chief of Stingarige, and a descendant of Harald I. In his boyhood, he was present at the battle of Sticklestad, in which his brother Olaf, surnamed the saint, king of Norway, was slain; and he afterwards sought an asylum at the court of his relative, Jaroslav, duke of Russia, whose daughter he sought in marriage. The rejection of his suit, however, again drove him forth, and he entered upon romantic adventures; and having gone to Constantinople, and become capt. of the Væringjar, or Scandinavian body-guard of the Greek emperors, he experienced many marvelous adventures, which have supplied abundant materials for the narratives of the older sagas and modern romances of the north. Harald took part in the expedition against the pirates of the Mediterranean; visited Jerusalem, where he fought successfully against the Saracens, whom he also defeated in Sicily and Africa in 18 pitched battles. On his return to Constantinople, he drew upon himself the vengeance of the empress Zoe, whose proffered love he had rejected, and with difficulty escaped from the prison into which he had been thrown, on pretense of treason. Having made good his escape, he returned to Russia, married the daughter of duke Jaroslav, and took her with him to Norway, where his nephew, Magnus (the son of St. Olaf), agreed to divide the supreme power with him, in return for a share of his treasures. The death of Magnus in 1047 left him sole king of Norway. His unruly spirit would not, however, suffer him to rest; and in opposition to the pledge he had given his dying nephew, he entered into a war to dethrone the king of Denmark, on whose crown he had no just claim. Although he was successful in battle against the Danes, he gained no real advantages by the contest; and in 1064 he recognized the right of Svend, the nephew of Canute, to the throne of Denmark, and having concluded a peace, occupied himself for a time with the internal affairs of Norway. In 1066 he landed in England to aid Tostig against his brother Harold, king of England, but was slain in battle; his followers, after having fought with desperation, were obliged to retreat to their ships, in which they sailed for Norway, under the command of Olaf, the son of the slain monarch (Sept. 25, 1066).

HARALSON, a co. in n.w. Georgia, on the Alabama border, drained by the Tallapoosa river; 400 sq.m.; pop. '70, 4,004—319 colored. The surface is hilly and largely covered with forests. Corn and cotton are the chief productions. Co. seat, Buchanan.

HARAN, or CHARRAN, a district in the n. of Mesopotamia, and a t. 10 m. s.e. of Edessa on the river Belek, 50 m. n. of the junction with the Euphrates. The town is immediately on the highway between Arrapachitis and Canaan, and at the point where the highway is crossed by the great western road connecting Media, Assyria, and Babylonia with the Cilician coast. For the Assyrians it became a strategic position of first-rate importance, and in this respect it is mentioned in inscriptions as early as the time of Tiglath Pileser I., about 1100 B.C. It also, for the same reason, ultimately became the center of considerable commerce, one of whose specialties particularly named was the odoriferous gum derived from the strobus. It was here that Crassus in his eastern expedition was attacked and slain by the Parthians; and here also the emperor Caracalla was murdered at the instigation of Macrinus, 217 A.D. Herodian mentions the town as possessing in his day a temple of the moon; in the middle ages it is referred to as having been the seat of a particular heathen sect, that of the Haranite Sabeans. It retained its importance down to the period of the Arab ascendency; but by Abulfeda it is mentioned as having before his time fallen into decay. It is now wholly in ruins. According to patriarchal history, Haran was the first resting-place of Terah and his family, after their migration from Ur of the Chaldees, and here Terah and Nahor remained when Abraham and Lot passed on to Canaan.

HA'RAR, a city of east Africa, in the country of the Gallas, the ancient metropolis of the Hadyah empire, about 219 m. s.w. of Berbera, which lies opposite to Aden, at the mouth of the Red sea; lat. 9° 20', long. 42° 17'. The city, which is about 5,500 ft. above sea-level, lies upon the slope of a hill from w. to e.; in the latter direction are plantations of bananas, citrons, limes, the coffee-tree, the khat—a theine plant well known in Arabia—wars or "bastard saffron" (safflower), and sugar-cane; westward are gardens and orchards on a terraced slope; northward is a hill covered with tombs; and to the s., the city falls into a valley or ravine. It is about one mile long by half a mile broad. The streets and alleys are like mountain roads, strewed with rubbish and with heaps of rocks; and the abodes, built of sandstone and granite, cemented with a reddish clay, present a dingy appearance. Harar is surrounded by an irregular wall, pierced with five large gates, and defended by rudely-built oval turrets. The men are very unprepossessing in appearance; but the women are much better looking and appear to be of a different type. The men are engaged in trade, while the women spin, weave, and cultivate the gardens. Morals are very lax, and the people are much addicted to intoxication with mead and Abyssinian beer. The language of the inhabitants is Arabian, mixed with some apparently indigenous African dialect, and is spoken nowhere else. Harar is celebrated for sanctity, erudition, and fanaticism, none but the purely religious sciences being studied. The people are extremely bigoted, and hold all foreigners, but particularly Christians, in hatred and contempt. The city is governed by an emir, whose will is law, who demands the utmost obsequiousness from all under

him, but who administers his will with a certain amount of rude but prompt justice. Murderers are given up to the nearest kin, and their throats publicly cut with a butcher's knife. Harar is essentially a commercial town. It is the grand depôt for the coffee, the warsdye, the cotton, the gums, the tobacco, and the grain of the Galla country, the produce of which is conveyed to Berbera three times a year in immense caravans. There is also an enormous slave-trade carried on, Harar being a rendezvous for slave-caravans from all the surrounding countries. The imports are American cottons, shawls, silks, brass, copper, cutlery, dates, rice, sugar, gunpowder, and paper. Provisions are exceedingly cheap, 120 fowls, according to Burton, being purchased for a dollar, and the same sum sufficing to provide a man with bread for a year. The only coin is a bit of brass, coarsely stamped, equal to the 66th part of a dollar; and the emir imprisons all subjects who possess any other money.

Harar was founded by Arab invaders, who, in the 7th c., conquered and colonized the tract between the Red sea and the Abyssinian mountains. Pop. 10,000, inclusive of a considerable number of Gallas and other Bedouins. It was visited in 1855, at a great risk, by the fearless and indefatigable Burton (q.v.), to whose interesting account we are indebted for most of our information.—See Burton's *First Footsteps in Eastern Africa* (Longman, 1856).

HARBAUGH, HENRY, D.D.; 1817–67; b. Penn.; when young was a farmer, a carpenter, a miller, and a teacher. He studied at Marshall college and in 1843 became pastor of a German reformed church, and in 1864 professor of theology in Mercersburg seminary, where he was the chief exponent of the Mercersburg theology. From 1850 to 1866 he was the editor of the *Guardian*, a monthly magazine, and afterwards of the *Mercersburg Review*. He published some poems in the Pennsylvania Dutch dialect. Among his other works are *Heaven; The Heavenly Recognition; Heavenly Home; Life of Michael Schlatter; The Fathers of the German Reformed Church; Christological Theology*, and an illustrated work on the *Birds of the Bible*.

HARBOR, an inlet of the sea, so protected from the winds and waves, whether by natural conformation of the land, or by artificial means, as to form a secure roadstead for ships. It is with those harbors wholly or in part artificial that this article will deal.

Harbors may be divided into harbors of refuge, and those for commercial purposes. The latter are mostly tidal—i.e., capable of being entered by vessels only at certain states of the tide. The former are roadsteads of good depth, protected by breakwaters, and accessible at all tides, where ships may take refuge during storms. The two kinds are sometimes combined, there being the harbor proper, and a capacious protected roadstead outside of it, as at Cherbourg and elsewhere. See BREAKWATER, CHERBOURG, DOVER, PLYMOUTH, PORTLAND, HOLYHEAD.

With the birth of commerce and naval warfare, in the earliest ages of civilization, arose the necessity for artificial harbors. The Phenicians, the fathers of navigation, soon set to work to protect their scanty strip of Levantine coast. At Tyre, two harbors were formed, to the n. and to the s. of the peninsula on which the city was placed. At Sidon, similar but less extensive works long testify to the wealth and engineering genius of the Phenicians. The breakwaters were principally constructed of loose rubble.

Carthage, in another part of the Mediterranean, also possessed a harbor, though its site is not very satisfactorily determined. It was in two divisions, formed by moles; time, however, has dealt so hardly with it, that few traces remain. Still keeping to the great inland sea, we come to Greece; but here nature had provided so many navigable inlets, that little remained to be done by man. Nevertheless, some minor works were executed at the Piræus and elsewhere, chiefly, of course, for warlike purposes. The Romans, finding ships necessary to the dominion of the world, set about constructing harbors for them, in their usual solid and workmanlike manner. The coasts of Italy still show how well they understood both the principles and the practice of this branch of marine engineering. A distinguishing feature of their harbor-making is the open or arched mole. Built with open arches, resting upon stone piers, it gives full play to the tidal and littoral currents, thus preventing the deposit of sand or mud; but in proportion as this advantage is increased (by increasing the span of the arches), so also is the agitation, and consequent insecurity of the water within.

The decay of commerce and civilization, consequent upon the fall of the Roman empire, put a stop to harbor-making; nor could any want of the art be felt, until the revival of commerce by the Italian republics of the middle ages. But the rich traffic of Venice and Genoa soon led to the construction of suitable ports at those places; and the moles of the latter city, and the works in the lagunes of Venice, remain to this day. France was next in the field, embanking, protecting, and deepening the mouths of the rivers along her north-western shores, as at Havre, Dieppe, Dunkirk, etc. In 1627, during the siege of Rochelle, Metezeau constructed jetties of loose rubble-stone, to prevent access to the city.

Meanwhile, England, whose ocean-commerce is of comparatively recent date, and whose fisheries even scarcely employed a vessel three hundred years ago, lagged far behind her continental rivals. With few exceptions, her ports were absolutely unprotected, or rather uncreated; and this state of things continued until late in the last century. One of the few exceptions was Hartlepool, where a harbor was formed about

1250; and Arbroath, in 1394. In the 17th c., at Whitby and Scarborough, also in Yorkshire, rough piers were thrown out, protecting the mouth of the port; while at Yarmouth, in Elizabeth's reign, a north jetty, and subsequently a south one, were formed. An ancient mole existed at Lyme Regis. But the chief efforts of the early English engineers were directed against the shoals and waves of Dover, when, however, Smeaton rose to vindicate the engineering talent of England, things took a different turn; and now few countries surpass Great Britain in the number of artificially improved commercial harbors, or in the just appreciation of their importance.

In the construction of harbors, the great desiderata are sufficient depth of water and perfect security for the vessels likely to frequent them, together with the greatest possible facilities for ingress during any weather; while the chief obstacles to be surmounted are the action of the waves upon the protecting piers and breakwaters, and the formation of sand-banks and bars.

The design of harbors may be classified under the following heads: 1. Harbors of refuge and anchorage breakwaters; 2. Deep water and tidal harbors for commercial purposes; 3. Kanted or curved piers; 4. Straight piers; 5. Quays or wharves.

These different works are obviously suited for different localities, and for contending with different exposures. The last-mentioned is clearly suited for the most sheltered situations only, and the engineer must consider, when designing a harbor, which of all those will be most economical and effective. In judging of this, the geological features of the coast must be carefully considered. A good chart furnishes valuable evidence as to the forces to which harbor-works will be exposed. Among those may be noted the *line of maximum exposure*, or the greatest fetch or reach of open sea in front of the harbor. Mr. Thomas Stevenson, civil engineer, has proved by observations that *the waves increase in the ratio of the square root of their distances from the windward shore* as measured along the line of exposure, and he gives the following simple formula: Where h = height of wave in feet during a strong gale, and d = length of exposure in miles for distances of say 10 miles and upwards:

$$h = 1.5 \sqrt{d}.$$

The heights so obtained will be increased when they pass into confined channels, and decreased when they pass into expanding channels. The greatest measured height of the waves was by Scoresby in the Atlantic ocean, where he found billows of 43 ft. in height from hollow to crest, and 36 ft. was not an uncommon height. At Wick, Caithness-shire, waves of about 40 ft. strike the breakwater.

The greatest recorded forces exerted by the waves are the following: A mass of 13 tons was broken or quarried out of its position *in situ* on the skerries of Whalsey, in Zetland, at a level of 74 ft. above the sea; but the most astonishing feat of which we have any knowledge was at Wick breakwater, where, in the winter of 1872, a mass of masonry, concreted together as a monolith, and bound with iron bars 4½ inches in diameter, and weighing no less than 1350 tons, was torn from its seat in the work, and thrown to leeward, where it still lies in an unbroken state.

Mr. Thomas Stevenson, by means of an instrument called the marine dynamometer, has ascertained *numerically* the force which is exerted by the waves in the Atlantic and German oceans, and has found that the mean of observations during winter was more than three times that exerted during summer, the maximum force recorded being 3½ *tons per square foot.*

Various local causes materially affect the height and therefore the force of the waves. In some cases, where a strong current sets off the coast, as at Sumburgh Head roost, in Zetland, it causes a dangerous breaking sea, and while this roost or race continues to rage, the coast under lee is comparatively sheltered; but when the force of the tide is exhausted, and the roost disappears, a heavy sea rolls in upon the shore.

It is this encounter between the ground-swell of the ocean and the current of tide or land water, which causes miniature races at the mouths of rivers. Another most material element in the question of exposure is the depth of water in front of the harbor; for if that depth be insufficient to admit of the propagation of the waves, they break or spend themselves before they reach the piers. Thus, Mr. Leslie found at Arbroath harbor that the works were not so severely tried by the heaviest waves as by others of lesser size which were not tripped up and broken by the outlying rocks. In the same way at the river Alne, the harbor within the bar is more disturbed by ordinary waves than during great storms. It thus appears that the largest waves are not always so destructive as smaller ones. Mr. Scott Russell has stated the law, that waves break whenever they come to water as deep as their own height; so that 10 ft. waves should break in 10 ft. water, and 20 ft. waves in 20 ft. water. There seem, however, to be some waves which break on reaching water whose depth is equal to twice their own height. Proofs of the depth to which the surface undulations extend have been given by sir George Airy, sir John Coode, capt. Calver, and Mr. John Murray, C.E. The late Dr. Rankine has shown that the crest and trough of the sea are not, as was generally believed, equidistant from the level of stagnant water. When l is the length of the wave, H its height from trough to crest,

$$\text{Crest above still water} = \frac{H}{2} + \cdot 7854\frac{H^2}{l}.$$

$$\text{Trough below still water} = \frac{H}{2} - \cdot 7854\frac{H^2}{l}.$$

There is much difference of opinion among engineers as to the best profile or cross section of breakwaters for deep-water harbors. It is asserted by col. Jones and others, that in deep water the waves are purely oscillatory, having no power of translation, and therefore incapable of exerting any force against the masonry. This, however, is incorrect, and calculated to lead to dangerous consequences. Were there no wind propelling the waves, and no current to interfere with their character, such a result might be true. This, however, is not the case, and all sea-works, in whatever depth of water they may be placed, will assuredly have to withstand impulsive action. Besides, it must be kept in view, that in order to reduce the expense of construction, it is essential, where the bottom is soft, to make the foundation a pile of loose rubble, or concrete blocks. It follows, from what has already been said, that the rubble, by shoaling the water in front of the work, will cause the waves to become waves of translation before they reach the vertical superstructure, which, assuming the waves to have been simply oscillatory, would have reflected them without breaking, and therefore without their having exerted an impulsive force upon the masonry.

There is, however, no fixed rule as to the profile of any sea-work, which must necessarily depend upon a variety of local peculiarities, such as the nature of the bottom, and the size and quality of the materials. While a long, sloping breakwater does not offer the same amount of resistance to the waves, neither is it in itself so strong, for the weight resting on the face-stones is decreased in proportion to the sine of the angle of the slope. On the other hand, the tendency of the waves to produce horizontal displacement, supposing the direction of the impinging particles to be horizontal, is proportional *to the cube of the sine of the angle of elevation of the wall.*

In tidal harbors, or those in shoal-water, it is admitted by all that the waves break, and therefore exert an impulsive force. Such works have to withstand (1.) The direct horizontal force which tends to remove the masonry: (2.) The vertical force acting upwards on projecting stones or protuberances, and against the lying beds of the stones; (3.) The vertical force acting downwards upon the talus wall, or passing over the parapet, and falling upon the roadway; and (4.) The back-draught, which is apt to remove the soft bottom in front of the work.

In designing the ground-plan of harbors, some rules should be kept in view: (1.) The entrance should be always kept seawards of the works of masonry; (2.) Long straight piers are not so safe as those of horizontal curvature; (3.) There should be a good "loose," or point of departure free of rocks or a lee shore; (4.) The relation of the width of entrance to the area of a harbor should be a matter of careful study, as upon this depends the tranquillity of the interior, or what has been called the reductive power of the harbor. Mr. Stevenson's formula for the reductive power is as under: H = height of wave at entrance; b = breadth of entrance; B = breadth of harbor at place of observation; D = distance from mouth of harbor to place of observation; x = reduced height of wave at place of observation.

$$x = \frac{H\sqrt{b}}{\sqrt{B}} - \frac{(H + H\frac{\sqrt{b}}{\sqrt{B}}\sqrt{D})}{50}$$

The late Mr. J. M. Rendel's plan of depositing rubble from open stages of pile-work is now universally used in the construction of deep-water piers. Sir J. Hawkshaw's method, adopted at Holyhead, consists of huge, irregular, undressed masses, set in hydraulic mortar, and resting upon *pierres perdues.*

The commercial value of a harbor increases, according to Mr. Stevenson, not simply as the depth of the water is increased, but as *the cube of the depth.* Hence the great expense which is willingly incurred for securing even a foot or two of additional depth. The greatest feat in deepening is at the Tyne, where Mr. Ure, C.E., dredged out the channel to 20 ft. at low water all the way up to Newcastle. Scouring is also employed for increasing the depth, as by sir W. Cubitt at Cardiff, where 2,500 tons of water a minute are let off. The late Mr. Rendel's scheme for Birkenhead was based simply on the quantity liberated and the sectional area of the channel, and was therefore operative for any distance, and did not depend on the propelling head, or on the direction in which the water left the sluices, which conditions regulate ordinary scouring on the small scale, and which is efficacious for only short distances from the outlet.—Docks (q.v.) of various kinds are connected with harbors.

Pine timber is admirably adapted for soft soils, when the exposure is not great, but owing to the ravages of the *teredo navalis* and *limnoria terebrans* in localities where there is no admixture of fresh water, it is soon destroyed. Greenheart, African oak, and bullet-tree are little affected by the worm, as shown by experiments made in 1814

at the Bell Rock by Mr. Robert Stevenson. Even limestone and sandstone are perforated by the pholades and saxicavæ. Metals also suffer from chemical action when immersed in salt-water. Mr. George Rennie's experiments showed that wrought-iron resists this action better than cast in the ratio of 8 to 1; while Mr. Mallet's experiments show that from $\frac{1}{10}$ to $\frac{4}{10}$ of an inch in depth of castings 1 inch thick, and about $\frac{6}{10}$ of wrought-iron, will be destroyed in a century in clean salt-water. A cannon-ball $4\frac{1}{2}$ in. in diameter became oxidized to the extent of $\frac{3}{4}$ of an inch in the century. The use of Portland cement may be regarded as the most important of recent improvements in harbor construction. Blocks of any size can be formed of sand, gravel, or stones, mixed with cement in the proportion of 1 of cement to 9 of the other materials. This will set readily in still water, and in a week will be nearly as hard as any ordinary sandstone. Sea walls of cement work can also be built continuously, so as to constitute a single monolithic mass.

Reference may be made to sir J. Rennie's book on *Harbors*, to that of Mr. Thomas Stevenson on the same subject, and to the minutes of institution of civil engineers, *passim*.

HARBORS (*ante*). On the U. S. sea-coast nearly all harbors are natural, the only conspicuous exception being that at Lewes, Del. (See BREAKWATER.) The chief harbors on the Atlantic coast are Eastport, Machias, Belfast, and Portland in Me.; Portsmouth, N. H.; Newburyport, Salem, Boston, Barnstable, and New Bedford, Mass.; Newport, R. I.; New London, and New Haven, Conn.; New York (the most ample and important harbor on the continent); Perth Amboy, N. J.; Lewes, Del.; Baltimore, Md.; Norfolk, Va.; Newbern and Wilmington, N. C.; Charleston and Port Royal, S. C.; Savannah and Brunswick, Ga.; Fernandina, Key West, and Pensacola, Fla.; the latter on the gulf of Mexico; also on or near the gulf, Mobile, Ala., New Orleans, La., and Galveston, Tex. On the Pacific are San Diego, Santa Barbara, Monterey, and San Francisco, Cal.; Astoria, Or.; Port Townsend, Wash. Ter.; and Sitka, Alaska. There are many ports of less commercial importance but still having some trade. On the great lakes much has been done to improve natural or make small artificial harbors. In a business view Chicago, on lake Michigan, is the most important of the interior harbors. Here a shallow river has been deepened and some artificial means of protection are employed in the form of breakwaters. Nearly the same course has been pursued at Oswego on lake Ontario, and at Buffalo and Dunkirk on lake Erie, and a harbor of refuge is in progress on the w. side of lake Huron. There are 70 harbors on the lakes, most of which are in part artificial.

HARBORS, or PORTS, in law. In England, as well as Scotland, the right to erect and hold ports and havens is vested in the crown. Nevertheless, this right may legally exist in the subject, provided the latter can prove that he has a charter or grant from the crown, or has exercised the right from time immemorial, which presumes a charter or grant. But even though an individual has a right to a particular port or harbor, he holds it charged with or subject to the right of the public to make use of it. The crown has also the superintending power of opening and shutting ports for the purpose of prohibiting the importation or exportation of goods. It is also a settled maxim that the duties or tolls exacted should be reasonable and moderate. In England the grantee of a port is presumed to be bound to repair it; but in Scotland this obligation only extends to compel the owner to apply the dues towards repairs so far as they will go.

In most cases the powers of the common law have been insufficient to regulate the progressive wants of the public as regards harbor accommodation; and various acts of parliament have been passed for the purpose of authorizing harbors to be constructed, or extended and improved, and for exacting dues or tolls for the purpose of repaying the expenses. In 1847 a general consolidation act (10 Vict. c. 27) was passed for the United Kingdom, providing a code for the regulation of the procedure and conduct of all bodies, commissioners, etc., charged with making and improving harbors, docks, and piers. The duties of such bodies are there defined in all their details, as well as the mode of levying and collecting the tolls. The act was amended in 1861. Various local acts are also from time to time passed to meet the peculiar wants of localities. The principle of all these acts is, that the commissioners are empowered to make the works, and, by way of paying for the expense, to levy a small toll on those who use the harbor.

HARBOR GRACE, a port of entry on the w. side of Conception bay, Newfoundland, next to St. John, the most important t. in the island; pop. 6,770. The harbor is large, but greatly exposed to the sea; the wharves are protected by the beach. The place has a large trade. The most conspicuous edifice is the Roman Catholic cathedral, the seat of an archbishop.

HARBURG, an old t. and rising seaport of Hanover, in the province of Lüneburg, is situated four and a half miles s. of Hamburg, on the southmost branch of the Elbe, in a marshy district at the foot of a wooded chain of hills. It is an important Prussian station for collecting customs. Sugar-refining and tanning are extensively carried on, as well as manufactures of woolens, linens, and hosiery. Its transit-trade with Hamburg and the countries s. of the Elbe, which has long been considerable, has recently received a favorable impetus by the construction of the Hanover and Harburg railroad, and by the deepening and enlarging of its harbor, which can now accommodate 500 vessels, and

admits of landing cargoes at the wharves. The passenger-traffic between Harburg and Hamburg is carried on by steamers and ferry-boats as well as by rail. Harburg is a place of holiday resort for the Hamburgers. Pop. '75, 17,131.

HARCOURT, SIR WILLIAM GEORGE GRANVILLE VERNON, LL.D., b. England 1827; graduate at Trinity college, and took up the practice of law. In 1866 he was appointed queen's counsel. He was returned to the house of commons for the city of Oxford in the Liberal interest in 1868, and still represents that constituency. He was elected professor of international law in the university of Cambridge in 1869. He was a member of the royal commission for amending the neutrality laws, and of the royal commission for amending the naturalization laws. He was appointed solicitor-general in 1873, and held that office until the resignation of Mr. Gladstone's administration in the following February. He was one of the original contributors to the *Saturday Review*, and has written various political pamphlets and letters on international law in the *Times*, published under the pseudonym of "Historicus." The latter were reprinted in a volume, with considerable additions. He married first, Therese, daughter of lady Therese Lewis; and secondly, in 1876, Mrs. Ives, daughter of the late John Lathrop Motley.

HARDEE, WILLIAM J., 1818–73; b. Ga.; graduated at West Point, served with bravery in the Florida and Mexican wars; was on the frontier for several years; then teacher of tactics at West Point, and in 1860 was made lieut.col of cavalry. He went with the confederates in the war of the rebellion, and surrendered to the union forces in North Carolina along with Johnston's army, just at the close of the war. He is best known for a work on *Rifle and Light Infantry Tactics*, largely copied from French authorities.

HARDEMAN, a co. in s.w. Tennessee bordering on Mississippi, intersected by Big Hatchee river, and by the Memphis and Charleston, and the New Orleans, St. Louis and Chicago railroads; 760 sq.m.; pop. '70, 18,074–6,874 colored. Level with fertile soil; main products: cotton, corn, lumber, and pork. Co. seat, Bolivar.

HARDEMAN, a co. in n. Texas on Red river adjoining the Indian territory, organized after the census of 1870, and still unsettled.

HARDENBERG, FRIEDRICH VON, better known by his literary pseudonym of NOVALIS, was the son of baron von Hardenberg, and was b. at the family residence in Prussian Saxony in 1772. His father, then director of the Saxon salt-works, was a man of a religious disposition, and a member of the Herrnhut communion, while his mother is described as "a pattern of noble piety and Christian mildness." Young Hardenberg inherited the serious and reverential nature of his parents. He studied at Leipsic and Wittenberg. After a brief life, made beautiful by love, friendship, study, and literary activity, he died of consumption, Mar. 19, 1801, in the arms of his friend, Friedrich Schlegel. His chief works are *Lehrlinge zu Sais* (Disciples at Sais;) a physical romance, "containing," says Carlyle, "no story or indication of a story, but only poetized philosophical speeches, and the strangest shadowy allegorical allusions;" *Heinrich von Ofterdingen*, intended, as he himself informs us, to be an "apotheosis of poetry," but which he was not spared to finish; and *Hymnen an die Nacht* (Hymns to the Night). "Hardenberg," says Carlyle, "is the most ideal of idealists." A profound, beautiful, but indefinite aspiration breathes through all the fragments he has left us. What he lacks is force, activity, and common-sense vigor of understanding. Hardenberg belonged to the romantic school of German literature, but he took no part in the controversies of his friends. His *Sämmtliche Schriften* were published in 1802 (5th ed. 1837) by Tieck and F. Schlegel, the former of whom prefixed a biography. See Carlyle's *Miscellaneous Essays*.

HARDENBERG, KARL AUGUST, Prince Von, a Prussian statesman, was b. at Essenroda, in Hanover, May 31, 1750. He was educated at Leipsic, Göttingen, and Metzlau, and during 1770–78, traveled in Germany, France, Holland, and England. On his return to Hanover, he became privy-councilor of the exchequer, and was raised to the rank of count; but a quarrel with the prince of Wales, originating in a matter deeply affecting his honor, induced him, in 1782, to quit the service of the Hanoverian government. He now repaired to the court of Brunswick, where the duke appointed him, in 1787, president of the council of state. He was also commissioned by his master to convey the will of Frederick the great, which had been deposited in the duke's hands, to the new king, Frederick-William, who received him with marked distinction. In 1790 the markgraf of Anspach and Baireuth having requested the Prussian monarch to furnish him with a person competent to administer the affairs of his dominions, Frederick-William recommended Hardenberg. After Anspach and Baireuth were united with Prussia in 1791 Hardenberg was appointed a Prussian minister of state, and a member of the cabinet ministry. At the commencement of the war with France the king summoned him to his head-quarters at Frankfort-on-the-Main as administrator of the army. Early in 1795 he was sent to Basel, where, on April 5, he concluded a peace between Prussia and the French republic. On the accession of Frederick-William III. in 1797, Hardenberg was recalled to Berlin, and was intrusted with the management of all foreign affairs. In 1804 he became first Prussian minister on the resignation of Haugwitz, and in this capacity endeavored to preserve neutrality between France and

England. But when the French troops attacked Anspach, he changed his policy, and addressed a strong remonstrance to marshal Duroc. After the victory of Napoleon at Austerlitz, Prussia was compelled to enter into arrangements with Napoleon, Hardenberg was deprived of his office, and Haugwitz, who was friendly to the French, returned to power. In 1806 Prussia was again led to declare war, and after the fatal battle of Jena, Hardenberg accepted for some time the portfolio of foreign affairs at the desire of the emperor Alexander. In 1810 he was appointed chancellor of state. Prussia was at this period in a deplorable condition, humbled in the very dust before France; nevertheless, Hardenberg was sagacious enough to perceive that the power of Napoleon was on the wane. He labored ardently to create a national feeling—a patriotic thirst for revenge. The victories of the British troops in the Spanish peninsula, and the disasters that overwhelmed in ruin Napoleon's vast army in Russia, greatly assisted him in his efforts, and he had the satisfaction of beholding them crowned with success. His exertions were unwearied; he subscribed to the peace of Paris, June 1814; and was soon after raised to the rank of prince by his sovereign. He accompanied the allied sovereigns to London, took part in the proceedings of the congress at Vienna, and in the treaties of Paris (1815). In 1817 he reorganized the council of state, of which he was appointed president. He was also present at the congresses of Aix-la-Chapelle, Carlsbad, and Vienna, and drew up the new Prussian system of imposts. During a tour through the n. of Italy he was taken ill at Pavia, and died at Genoa, Nov. 26, 1823. The services rendered by Hardenberg to his country were undoubtedly great; to him Prussia is mainly indebted for the improvements in her army system, the abolition of serfdom, of the privileges of the nobles, and of a multitude of trade corporations, besides the complete reform of her educational system. The MSS. of his memoirs of the period from 1801 to the peace of Tilsit, were sealed up by Frederick-William III., who deposited them in the archives of the state, and forbade them to be opened before the year 1850. See Von Ranke's *Denkwürdigkeiten des Fürsten von Hardenberg* (4 vols. 1877).

HAR'DERWIJK, a small seaport and fishing-town of the Netherlands, in the province of Guelderland, is situated on the eastern shore of the Zuider Zee, 31 m. e. of Amsterdam. It is fortified after an ancient fashion. It has a harbor, but only fit for fishing-boats and small trading vessels. There is accommodation for 1000 soldiers. Pop. '75, 6,419.

HARDHACK. See SPIRÆA, *ante.*

HARDHEAD. See MENHADEN, *ante.*

HARDICANUTE, king of England, son of Canute the great by Emma of Normandy, the widow of Ethelred II. At the time of his father's death Hardicanute was in Denmark, and the throne of England was usurped by Harold his younger brother, Emma, however, preserving her son's authority over Wessex. In this state matters remained for some time, till Alfred, Emma's younger son by Ethelred, invaded the kingdom; but the invaders being annihilated by earl Godwin, Harold's general, Emma was obliged to seek refuge at Bruges, whence she sent to Hardicanute to acquaint him with the state of affairs in England. Hardicanute being of an easy and self-indulgent disposition, allowed two years to pass before taking any steps to assert his rights. Roused at last by his mother's remonstrances, he, in 1039, equipped a fleet and army, and was about to sail for England to dispossess the usurper, when he was met by a deputation of English nobles, who informed him of the death of Harold, and offered him the crown. Hardicanute reigned in England till 1042, when, after a quiet reign, he died of apoplexy, induced by his gluttonous habits. With Hardicanute ended the Danish line in England.

HARDIE, JAMES ALLEN, b. N. Y. 1823; graduated at West Point in 1843, and entered the artillery service. During the war of the rebellion he accompanied McClellan as aid-de-camp in the Maryland campaign, distinguished himself in the Rappahanock campaign, and was delegated to special duty in the war department. In 1866 he proceeded as senior member of commission to inspect the forts and arsenals of the union, and was more than once auditor of military claims. He has published several military reports, and has contributed to several leading periodicals.

HARDIN, a co. in s.e. Illinois on the Ohio river; 175 sq.m.; pop. '70, 5,113. It has a rough surface and fertile soil; productions: corn, wheat, oats, etc. Co. seat, Elizabethtown.

HARDIN, a co. in n. central Iowa, intersected by the Dubuque and Sioux City, the central Iowa, and the Illinois Central railroads, and the Iowa river; 576 sq.m.; pop. '75, 15,029. It has an undulating surface of prairie and woodland; chief productions: wheat, corn, oats, hay, and pork. Co. seat, Eldora.

HARDIN, a co. in n. central Kentucky bounded e. by Salt river, and for a short distance on the n. by the Great Southern, and the Paducah and Elizabethtown railroads; 550 sq.m.; pop. '70, 15,705–2,276 colored. The surface is hilly and to a great extent covered with forests. Chief productions: corn, wheat, oats, and tobacco. Co. seat, Elizabethtown.

HARDIN, a co. in n.w. Ohio, on Scioto river, intersected by the Cincinnati, Sandusky and Cleveland, and the Pittsburg, Fort Wayne and Chicago railroads; 480 sq.m.; pop. '70, 18,714. The surface is level and there is much forest-land. Wheat, corn, hay, oats, and pork are the chief products. Co. seat, Kenton.

HARDIN, a co. in s. Tennessee, intersected by Tennessee river, which is navigable for steamers; 600 sq.m.; pop. '70, 11,768—1447 colored. Much of the land is covered with timber. Chief productions: cotton, corn, and pork. Co. seat, Savannah.

HARDIN, a co. in s.e. Texas, bounded by the Neches river; 900 sq.m.; pop. '70, 1460—242 colored. Very little of the soil is under cultivation, but corn, cotton, sugar, and rice are produced. Co. seat, Hardin.

HARDIN, JOHN, 1753–92; b. Va.; served in a rifle corps in the revolutionary war. In 1790 he served in the Indian wars under Harmar, and two years later was killed under a flag of truce by Indians, who coveted his horse and equipments.

HARDING, CHESTER, 1792–1866; b. Mass.; a portrait painter. He was of a family in reduced circumstances, worked on a farm and with a chair-maker, and afterwards with a house-painter. With the ordinary paints of the business he attempted portraits, and was not long in finding his true calling. In 1833 he went abroad and studied for three years. Among those whose portraits he painted were Madison, Monroe, J. Q. Adams, chief-justice Marshall, Charles Carroll, William Wirt, Clay, Webster, Calhoun, Washington Allston, Samuel Rogers, lord Aberdeen, the dukes of Norfolk, Hamilton, and Sussex, and Daniel Boone.

HARDING, STEPHEN, the third abbot of the celebrated monastery of Citeaux, and one of the most remarkable religious reformers of the 12th century. Of his parentage and youthful history, little is known beyond the fact that he was of a noble English family, and in early life a soldier. Under one of those religious impulses which so frequently occurred in the middle ages, he undertook a pilgrimage to Rome. He subsequently entered the French monastery of St. Claude de Joux, where he was so distinguished by his strict and exemplary life, that he was chosen abbot of the monastery of Bèze, with a view to the reformation of its discipline, which had become much relaxed. From this monastery he was transferred to that of Citeaux, where, on the death of Alberic in 1109, he was elected abbot. The rigor of observance which he here enforced had such an effect in deterring novices from entering the new order, that at first grave fears were entertained for its stability; but Stephen, placing his trust in the good cause which he had undertaken, persevered in the cause of reform; and he was rewarded, in 1113, by the accession of St. Bernard and thirty other youths, whose eminent virtue gave such an impulse to the institute, that in a short time the number of claimants for admission compelled him to found several new convents, and especially that of Clairvaux, which, under the rule of St. Bernard, attained to the very highest distinction in that age. Abbot Stephen continued, till his death in 1134, to direct the fortunes of the Cistercian order; and in 1119 he drew up, in conjunction with St. Bernard and other members of the brotherhood, the well-known constitutions of the order, entitled *Carta Caritatis*, which were approved by popes Calixtus II. and Eugenius III., and, with some modifications, have continued down to modern times, as the rule of the Cistercian institute. See *Mabillon Annal. Benedictin.* t. v. p. 205.

HARDINGE, CHARLES STEWART, Viscount, b. England, 1812; graduated at Oxford; represented Downpatrick in the house of commons from 1854 to 1856, when he succeeded to his title. Under lord Derby he was under-secretary of state for the war department. While his father was governor-general of India, young Hardinge was his secretary, and served as a major in the wars with the Sikhs. On his return he published *Views in India*, a sumptuous work illustrated with his own drawings.

HARDINGE, Viscount HENRY HARDINGE, field-marshal and commander-in-chief of the British army, the third son of the rev. H. Hardinge, rector of Stanhope, in the co. of Durham, was born Mar. 30, 1785, and was gazetted as ensign before he had attained his 15th year. He obtained a brigade command before his 25th year, and his foreign grade was commuted, shortly afterwards, for British rank, after which he was attached to the Portuguese army from 1809–13, in the capacity of deputy quarter-master-general. When Napoleon effected his memorable return from Elba, Hardinge joined the allied armies in Belgium, and was appointed by the duke of Wellington commissioner at the Prussian head-quarters. He lost his hand at Ligny, and was thus unable to participate in the crowning victory of Waterloo. In 1826 he entered parliament; and in 1828 succeeded lord Palmerston in the government of the duke of Wellington, as secretary of war. He next filled the office of secretary of Ireland. In 1844 he accepted the high post of governor-general of India, which he filled until 1847. When the great Sikh war broke out, he hurried to the north-western frontier of India, and served as second in command under lord Gough during the sanguinary and hard-fought battles of Moodkee, Ferozeshah, and Sobraon. After the pacification of Lahore, his services were rewarded by a viscounty, the East India company granting him a pension of £5,000, and parliament voting him an annuity of £3,000, for himself and his next two successors. On the death of the duke of Wellington in 1852, Hardinge was appointed commander-in-chief of the British army, a distinguished post which he filled during the

eventful epoch of the Russian war, and which he only resigned a few months before his death. In Oct., 1855, he was advanced to the rank of field-marshal. He died Sept. 24, 1856, at his seat, South Park, near Tunbridge, Kent.

HARD LABOR, an addition often made to the punishment of offenses besides mere imprisonment. This practice is said to have been introduced by the statute of 5 Anne, c. 6. It is now firmly established in the United Kingdom; and by express statute, the power of adding hard labor to the punishment of imprisonment, has been given in most cases, both as to indictable offenses and the more disgraceful offenses which are punishable summarily. The kind of labor is prescribed by the rules of the jail or prison, where provision must be made of the proper materials for the purpose. Picking oakum, working the tread-mill, etc., form part of this labor; and in general, the number of hours for such labor, unless in case of sickness, is ten hours daily.

HARDNESS, SCALE OF. The hardness of a body is measured by its power of scratching other substances. Variations in the degree of hardness presented by different crystallized bodies often furnish a valuable physical sign by which one mineral may be readily distinguished from others closely resembling it. Mohs selected ten well-known minerals, each succeeding one being harder than the preceding one, and thus formed the *scale of hardness*, which has been generally adopted by subsequent mineralogists. Each mineral in the following table is scratched by the one that follows it, and consequently by all the subsequent ones, and the hardness of any mineral may be determined by reference to the types just selected. Thus, if a body neither scratches nor is scratched by feldspar, its hardness is said to be 6; if it should scratch feldspar but not quartz, its hardness is between 6 and 7—the degrees of hardness being numbered from 1 to 10. The figures on the right indicate the number of known minerals of the same or nearly the same degree of hardness as the substance opposite to which they stand:

SCALE OF HARDNESS OF MINERALS.

1. Talc	23	6. Feldspar (any cleavable variety)	26
2. Compact gypsum, or rock-salt	90	7. Limpid quartz	26
3. Calcspar (any cleavable variety)	71	8. Topaz	5
4. Fluor-spar	53	9. Sapphire, or corundum	1
5. Apatite	43	10. Diamond	1

The cause of the varieties of hardness observed in different bodies is not known. The same substance—as, for example, a piece of steel—may, under the influence of different circumstances, be so soft as to take impressions from a die, or may be nearly as hard as a diamond.

HARDOUIN, JEAN, was b. in 1645, at Quimper, in Brittany, where his father followed the trade of a bookseller. Hardouin received his first education in the schools of the Jesuits, and being received into that order at the age of 20, completed his studies in Paris. On the death of Père Garnier in 1683, Hardouin was appointed librarian of the college of Louis le Grand, in which office he enjoyed full leisure for the literary pursuits in which he delighted, and in which his extravagances have acquired for him a notoriety almost without any parallel in the annals of literary eccentricity. Dupin places him among the very first scholars of his learned brotherhood. In a spirit of literary skepticism which it is difficult to look upon as serious, he maintained, not only that the entire body of classical literature, with the exception of in Latin, Pliny's *Natural History*, Virgil's *Georgics*, the comedies of Plautus, and Horace's *Satires*, and in Greek, Homer's *Iliad*, and Herodotus's *History*, was falsely ascribed to the authors whose various names it bears, but that it was all the production of the monks of the 13th century! In the same skeptical spirit, he rejected as spurious all the reputed remains of ancient art, together with the inscriptions and coins which are attributed to classical times; nay, he extended the same skepticism to the Septuagint version of the Old Testament, and even to the Greek text of the New, the original language of which he held to have been Latin! Opinions so extravagant naturally called forth the reprobation of the authorities of his order. He was required to retract them; and there is some reason to believe, that they were put forward by him rather from a love of paradox and a morbid desire of notoriety, than from any serious conviction of their probability. Nevertheless, with all this extravagance, the erudition of Père Hardouin was beyond dispute, and most of his works are of great historical and critical value. His edition of Pliny (5 vols. 4to, Paris, 1689) is a prodigy of learning and industry. Of his remaining works, the most valuable is his great *Collectio Conciliorum* (12 vols. folio), a work of great learning and utility, which has the rare advantage of possessing one of the best indexes extant; a commentary on the New Testament in folio; several volumes on the study of numismatics and chronology; and a vast number of dissertations and essays in the *Mémoires de Trevoux*. He died at the age of 83, in the convent of his order in Paris, Sept. 3, 1729.

HARDWAR, or HURDWAR, an old t. of India and place of pilgrimage, in Saharanpur district on the right bank of the Ganges at the foot of the Siwalik hills. Pop. '72, 4,800. The town is of great activity, and has borne many names. It was originally known as Kapila. Hwen Thsang, the Chinese Buddhist pilgrim, in the 7th c.

A.D., visited a city which he calls Mo-yu-lo, the remains of which still exist at Mayapur, a little to the s. of the modern town. Among the ruins are a fort and three temples, decorated with broken stone sculptures. The great object of attraction at present is the Hari-ke-charen, or bathing *ghat*, with the adjoining temple of Gangadwara. The *charan*, or foot-mark of Vishnu, is imprinted on a stone let into the upper wall of the *ghat*, and forms an object of special reverence. A great assemblage of people takes place annually, and every twelfth year a feast of peculiar sanctity occurs, known as a *kumbh-mela*. The ordinary number of pilgrims at the annual fair amounts to 100,000, and at the kumbh-mela to 300,000. The Hardwar meeting also possesses considerable mercantile importance, being one of the principal horse-fairs in upper India. Commodities of all kinds, Indian and European, find a ready sale, and the trade in grain and food stuffs forms a lucrative traffic. The Ganges canal draws its supply of water from a branch channel close to the town.

HARDWARE, a commercial term applied to the commoner articles made of iron, copper, or brass, such as locks, keys, anvils, grates, shovels, etc. The great hardware manufactures of this country are at Birmingham, Wolverhampton, Walsall, Willenall, Sheffield, etc. The extent of the trade of these places is enormous; the value of the exports of hardware alone amounting to millions. The returns for the years 1875 give for hardwares, including cutlery, £4,265,451. See IRON.

HARDWARE (*ante*), includes an enormous variety of articles manufactured from iron, copper, brass, or bronze, which are variously known as *carpenters'*, *housekeepers'*, or *builders'* hardware. It is almost impossible to classify the articles which come under the general term, including, as it does, many used by saddlers, miners, contractors, machinists, stationers, carbuilders, and furniture-makers and dealers. Toys, and the limitless varieties of what are called "fancy" articles, all belong to this branch of manufacture, and the yearly traffic in such ware is almost incomputable. A return of £12,000,000 was reported to the British government in 1871 from the principal hardware marts, while in the U. S. census of 1870, the different branches of American industry in hardware produced $142,836,272.

HARDWICK, CHARLES, 1821–59; b. England; killed by a fall in the Pyrenees. By his own efforts he obtained a good education, and in 1853 was professor of divinity in Queen's college. He was ordained a deacon and priest, and but a short time before his death was appointed arch-deacon of Ely. He published *History of the Middle Age of the Church*, *Christ, and Other Masters*, etc.

HARDWICKE, PHILIP YORKE, first earl of, 1690–1764; b. England; educated to the law, called to the bar in 1715, and four years afterwards was elected to the house of commons from Lewes, on which occasion the government paid his election expenses. In 1720 he was made a knight, and appointed solicitor-general, rapidly rising to be lord chief-justice of the king's bench, and in 1737 lord chancellor. While George II. was out of the country (1740–48 and 1752) the chancellor was one of the justices selected to administer the government. In 1754 he was made an earl, but two years later he resigned his office, and retired from public life.

HARD-WOODED TREES are forest-trees of comparatively slow growth, producing compact, hard, and valuable timber, as oak, ash, elm, chestnut, walnut, beech, birch, etc. From these, willows, elders, poplars, etc., are distinguished as *soft-wooded trees*. Neither term is extended to firs, pines, cedars, or other coniferous trees, the wood of which is of a peculiar and very different character.

HARDY, a co. in n.e. West Virginia, on the s. branch of the Potomac and the Cacapon rivers; 570 sq.m.; pop. '70, 5,518—616 colored. Its surface is mountainous, and to a large extent covered with timber. The valleys are fertile; corn and wheat are the main products. Co. seat, Moonfield.

HARDY, ALEXANDRE, 1560–1631; a French author; in early life writer for a strolling dramatic company, and later the dramatist for the *Théâtre du Marais*. He is said to have been after Lope de Vega and Calderon, the most fertile of dramatic authors, having written over 600 plays. He became a master of stage business and stage effects. To the student of the drama, Hardy will always be an interesting figure, appearing as he does between the degraded morality and the modern comedy, an imitator alike of Italian pastoral and Spanish tragedy. He gave little heed to art; he thought entirely of what would succeed for the moment. His best play is the tragedy of Marianne.

HARDY, GATHORNE, b. 1814; well known in English public life as a conservative politician and leader. He was under-secretary of state for the home department in 1858–59, and entered the British cabinet in 1866 as president of the poor-law board, the earl of Derby being premier. The cabinet resigned, however, two years later, and in 1869 Hardy was returned to parliament from Oxford university. In 1874 the earl of Derby again came into power, when Hardy was placed in charge of the war department, and in 1878, under the administration of the marquis of Salisbury, he was made secretary for India, and created viscount Cranbrook.

HARDY, THOMAS, b. 1840; an English writer of fiction. He served his time as an apprentice to an architect, and prosecuted his profession in London, where he became

chiefly known as a designer, favoring the modern Gothic style. In 1863 he received a prize from the institute of British architects for an essay on *Colored Brick and Terra-Cotta Architecture*, and also one for architectural design. Recognizing that he possessed skill as a writer, he turned his attention to fiction, and published his first work in 1871, without achieving marked success. In 1872 he brought out *Under the Greenwood Tree*, and in the following year, *A Pair of Blue Eyes*, and by these novels placed himself in the front rank of contemporary novel writers. His later works, *Far from the Madding Crowd* and *The Hand of Ethelberta*, have served to confirm public opinion of the excellence of his work. Mr. Hardy is a most original writer, skilled in the delineation of character, graphic, and sometimes dramatic in depicting situations, and a writer of strong and pure English.

HARDY, Sir THOMAS MASTERMAN, 1769–1839; was made commander in 1797 for distinguished bravery in the battle of St. Vincent. In 1803 he was Nelson's flag-captain, and at the battle of Trafalgar (Oct. 21, 1805) received Nelson's last words, "Don't throw me overboard: kiss me, Hardy." Hardy commanded the South American squadron from 1820 to 1824, and six years later was made a lord of the admiralty. In 1834 he was one of the governors of Greenwich hospital.

HARE, *Lepus*, a genus of rodent quadrupeds, of which there are many species very similar to each other. The Linnæan genus *lepus* now forms the family *leporidæ*, which includes the genera *lepus* and *lagomys*, and of which a peculiar characteristic is the presence of two small incisors immediately behind the ordinary rodent incisors of the upper jaw, so that these teeth seem to be double. The molar-teeth, six on each side above and five below, are transversely grooved, being formed of two vertical plates soldered together. All the animals of this family feed exclusively on vegetable food, and chiefly on herbage, although they are also fond of grain, roots, and the bark of trees. Their fore-feet have five toes, their hind-feet four; the soles are hairy. Their fur is soft; the colors mostly gray or brown, the alpine and arctic species becoming white in winter.—The COMMON HARE (*L. timidus*) is widely distributed over Europe and the northern and central parts of Asia. The IRISH HARE (*L. Hibernicus*) has, however, recently been described as a distinct species. It differs from the common hare in its rounder head, shorter ears, and shorter limbs; also in having the fur composed only of one kind of hair, short and soft, with none of the long black-tipped hairs which are mixed with this in the common species. The fur, therefore, is of no value. The common hare is not found in Ireland. Notwithstanding the character of timidity usually ascribed to the hare, it is really a pugnacious animal, and displays no little courage in encounters with those of its own race, or with animals of nearly equal powers. It has been an object of the chase from a very early period. Xenophon, in his *Cynegeticus*, gives an enthusiastic description of the sport. Concerning the hunting of the hare, see COURSING. Being evidently designed to seek safety from enemies by fleetness, the hare, however well supplied with food, never becomes fat. It ordinarily lies quiet in its *form* during the day, and goes in quest of food in the evening and morning. Where, through game preserving, it is abundant, it does no little damage to crops. It is a prolific animal, although not nearly so much so as the rabbit. The female produces from two to five at a birth. The young (*leverets*) are born covered with hair, and with the eyes open.—The VARYING HARE or ALPINE HARE (*L. variabilis*), which inhabits the mountains both of the n. and s. of Europe, and is found on those of Scotland and of Cumberland, is remarkable for the change of color which it undergoes, without change of hair, on the approach of winter. Ordinarily of a bluish-gray color, it becomes of a shining white, the change beginning with the feet, and extending upwards, terminating with the back. This, which in many places is called the *blue* hare, is about equal in size to the common hare, but has shorter limbs and ears, and is less swift.—In the arctic regions both of the old and new worlds, the ARCTIC HARE or POLAR HARE (*L. glacialis*) abounds. It is entirely white in winter, brownish-gray in summer, has long soft fur on the belly, and fine thick fur on the back; is considerably larger than the common hare, and spends the whole year without hibernation, even in Melville island, and similar cold desolate regions; lichens and mosses probably affording it the greater part of its food.—North America produces a number of other species of hare, of which some inhabit the swamps of the southern states.—India has a hare (*L. ruficaudatus*) very similar to the common hare; other species are found in other parts of Asia, Egypt, the cape of Good Hope, etc. The fur of the hare is used for felting for making hats and other purposes.

HARE, in point of English law, is one of the wild animals called game (q.v.), and is specially protected by the game-laws for the benefit of the owners of land. There is no close season as to hares, which may therefore be lawfully killed by a licensed sportsman all the year round. Being game, hares can only be bought from a licensed dealer, and sold by licensed persons. The owner of inclosed land, and also the tenant, if otherwise entitled by his lease to kill hares, may do so without a license. So those who hunt them with greyhounds or beagles require no license. All others require a license. To kill hares unlawfully by night in a warren, or place kept for breeding hares, is now a misdemeanor by 24 and 25 Vict. 96, s. 17; to kill them elsewhere, is only a misdemeanor when the third offense is committed. In Scotland, the law is substantially the same, except that the killing of hares unlawfully by night is only an offense

punishable summarily, unless it is a third offense, when it becomes indictable. In Ireland, there is a close season, when hares cannot be killed—viz., between the first Monday in Nov. and the first Monday in July following. See Paterson's *Game-laws of the United Kingdom.*

HARE, AUGUSTUS JOHN CUTHBERT, b. Rome, 1834, of English parents; educated at Harrow and Oxford, and devoted himself to literature. Among his publications are *Epitaphs for Country Churchyards; Walks in Rome; A Winter at Mentone; Memorials of a Quiet Life; Walks in London;* and a number of guide books.

HARE, AUGUSTUS WILLIAM, 1793–1834; brother of the archdeacon; b. England; educated at Oxford, and ordained rector in 1829. He wrote with his brother *Guesses at Truth,* and by himself, *Sermons to a Country Congregation.*

HARE, JULIUS CHARLES, 1796–1855; b. Italy; a theological writer. He passed a winter at Weimar, where he met Goethe and Schiller, and received a bias to German literature which influenced his style and sentiments throughout his whole career. On the death of his mother in 1806, Julius was sent home to the charterhouse in London, where he remained until 1812, when he entered Trinity college, Cambridge. There he became fellow in 1818, and after traveling abroad he began to read law in London in 1819. In 1822 he was appointed assistant-tutor at Trinity college, which position he retained for 10 years. Turning his attention from law to divinity, he was ordained in 1826; and on the death of his uncle in 1832, he succeeded to a rich family living in Sussex, where he accumulated a library of 12,000 volumes, especially rich in German literature. Before taking up his residence in his parish, he once more went abroad, and made, in Rome, the acquaintance of the chevalier Bunsen, who afterwards dedicated to him part of his work, *Hippolytus and his Age.* In 1840 Hare was appointed archdeacon of Lewes, and in the same year preached a course of sermons at Cambridge, *The Victory of Faith,* followed in 1846 by a second, *The Mission of the Comforter.* Neither series when published attained any great popularity. He married in 1844. In 1851 he was collated to a prebend in Chichester; and in 1853 he became one of the queen's chaplains.

HARE, ROBERT, 1781–1858; b. Philadelphia; in early life a brewer, but afterwards gave his attention to science, particularly chemistry. In 1802 he invented the oxy-hydrogen blow-pipe, and was the first to render fusible lime, magnesia, iridium, and platinum. In 1818 he was professor of chemistry in Pennsylvania university, holding the chair 29 years. His collection was presented to the Smithsonian institution. Besides many papers in the scientific journals he published *Brief View of the Policy and Resources of the United States; Chemical Apparatus and Manipulations;* and a *Compendium of the Course of Chemical Instruction.*

HAREBELL, or **BLUEBELL,** *Campanula rotundifolia,* the most common of all the British species of bellflower (see CAMPANULA), growing abundantly in dry and hilly pastures, on waysides, etc.; flowers in summer and autumn. It is common in most parts of Europe, and even to the extreme north. It is everywhere a favorite from its beauty and gracefulness, and is the subject of many allusions in poetry. It is a perennial plant, with a slender stem 6 by 14 in. high, sometimes bearing only one flower, but more generally a loose panicle of a few drooping flowers, on very slender stalks; the flowers sometimes white, but generally bright blue, bell-shaped, and fully half an inch long. The juice of the flowers yields a fine blue color, and may be used as ink.

HA'RELD, *Harelda,* a genus or sub-genus of ducks of the oceanic section (see DUCK), nearly allied to pochards, seaups, etc.; having a short, thick bill, high at the base, the laminæ projecting at the edge of the mandibles, a high forehead, a thick neck, and two feathers of the middle of the tail in the males greatly elongated; whilst the females have the tail short and rounded.—The LONG-TAILED DUCK, or HARELD (*H. glacialis*), inhabits the arctic regions both of the old and new worlds, remaining on the seas of the north as long as any water remains unfrozen, and then betaking itself to more southern regions. It is plentiful, during winter, in the inlets of Orkney and Shetland, but is rather rare in the southern parts of the British islands. It is sometimes brought to the London market. Its winter migrations in America extend as far south as Texas. The male, particularly in its summer plumage, is a very beautiful bird. It is about 17 in. long, without the long tail-feathers; with them, 22 or 24. It is a very lively and noisy bird; flies swiftly, and is a most expert diver. It lines its nest with down, which is said to be equal to that of the eider, but has not yet become an article of commerce.

HARELIP, a congenital perpendicular fissure or fissures through the upper lip, the result of an arrest of development, (Erichsen). It is named from its resemblance to the lip of a hare, but according to Geoffroy St. Hilaire, it is not analagous to that form of development, but to that which occurs in animals of lower development, viz: fishes. When the arrest of development takes place on one side only, the malformation is called single harelip, and according to Erichsen, it most frequently is located on the left side. When the fissure occurs on each side of the median line the malformation is called double harelip, and the fissure is always deeper on one side than on the other, generally extending into the nostril when it produces cleft palate, the nose being flattened and expanded. Median fissure is extremely rare. Delahaye saw a case of the upper lip, and Nicati one of the lower lip. The cure of harelip requires a very careful operation.

There is difference of opinion as to whether the operation ought to be performed before or after dentition, and those who advocate waiting urge that young children are apt to have convulsions from various exciting causes. The weight of authority, however, appears to be in favor of early operations, which are easier to perform before dentition. The child will also be better able to nurse, after the operation. In operating, it is important to procure direct union of the edges of the fissure, which are carefully pared and held together by silver sutures and straps of plaster, and a check compresser, an ingenious apparatus by which pressure upon the cheeks tends to keep the cut parts in opposition. The application of water-dressing, or a weak solution of carbolic acid, is often found serviceable, but need not be constantly applied unless, unfortunately, great inflammation occurs, when feeding will have to be done through a tube; but this is rarely the case.

HAREM, the European title for that portion of a polygamist's house which is devoted to the exclusive occupancy of his wives and their attendants, or, by a simple metonymy, for the female portion of his household. The word *harem* is Arabic for anything forbidden or not to be touched. It is generally applied in Moslem law to such things as games of chance, draughts, chess, witchcraft, and portrait-taking, which are inconsistent with the religious code, and under the form of *haram* it is well known, even to Europeans, as designating the sacred inclosure of the principal mosque at Cairo and at Jerusalem (*Haram-esclsaberig*). The word seraglio, which is not unfrequently employed as equivalent to harem, is an equivalent modification of the Persian term *serai*, which means a palace or large building, as in the familiar compound *caravanserai*. Wherever polygamy is maintained in the midst of a developed social life, the harem appears to be an almost inevitable institution. We consequently find it after a more or less rigid type among the Jews, the Babylonians, the Siamese, the ancient Persians, the Peruvians, etc. But it is among the modern Mohammedan peoples that it has attained its most perfect development; and the harems of the sultan of Turkey and the shah of Persia may be taken as the most elaborate and best-known specimens of the type. According to the Koran, the Mussulman is required to satisfy himself with four wives, but the sultan may possess as many as seven. Each of these has her own suite of apartments, her own garden and bath-room, and her own body of servants, male and female. They are not called by their names, but distinguished as *kadin* (or lady) number one, number two, and so on. The title of *sultana* is bestowed only on the mother, the sister, or the daughter of a sultan; and consequently it is the kadin who first gives birth to an heir to the empire who alone can have this distinction. She further obtains the title of *hasseky* or *kasseky*, but this is lost if the child dies. All the female slaves, or as they are called *odalisks* (a European corruption of the word *odalik*, from *oda*, a chamber, and *lik*, belonging to), are at the absolute disposal of the sultan, and if, in spite of the natural endeavors of the kadins to prevent such a contingency, one of them becomes the mother of her lord and master's first-born, she is advanced to the rank of *sultana hasseky*. It is contrary to etiquette for the sultan to select his own favorites among the odalisks; he is expected to accept the choice made for him by his mother, who bears the title of *valide*, and exercises great influence not only in the affairs of the harem but even in political matters. Every odalisk who has been promoted to the royal favor is henceforth considered sacred from all meaner patronage, and receives apartments and attendants of her own; but she has no further claim to the sultan's attention, and may have to console a life-long widowhood with the memory of the honor which was once bestowed on her. The ranks of the odalisks are ever and anon recruited by slaves presented to the sultan by his female relatives or the state officials. An old and devoted favorite of the sultan occupies the post of *kehaya chatun*, or lady superintendent of the harem. A large body of eunuchs, both black and white, are employed as guards and gate-keepers. The white eunuchs have charge of the outer gate of the seraglio, but they are not allowed to approach the women's apartments, and obtain no posts of distinction. Their chief, however, the *kapou aghassi*, or master of the gates, has part control over the ecclesiastical possessions, and even the vizier cannot enter the royal apartments without his permission. The black eunuchs have the right of entering the gardens and chambers of the harem. Their chief, usually called the *kizlaer aghassi*, or master of the maidens, though his true title is *darus seadet aga*, or chief of the abode of felicity, is an official of high importance. His appointment is for life. If he is deprived of his post he receives his freedom; and if he resigns of his own accord he is generally sent to Egypt with a pension of 100 francs a day. His secretary keeps count of the revenue of the mosques built by the sultans. He is generally succeeded by the second eunuch, who bears the title of treasurer or *khaznahdar*, and has charge of the jewels, etc., of the women. The number of eunuchs is always a large one. The sultana *valide* and the sultana *hasseky* have each fifty at their service, and others are assigned to the kadins and the favorite odalisks. [*Encyc. Brit.*, 9th ed.]

HARE'S-EAR, *Bupleurum*, a genus of plants of the natural order *umbelliferæ*, having compound umbels of yellow flowers, and generally simple leaves. The leaves of the most common British species, *B. rotundifolium*, embrace the stem and are roundish oval. This plant, which grows in corn-fields in the chalk districts, is the *thorough-wax* of the old herbalists, and was once in repute as a vulnerary, but has fallen into

disuse. The species of hare's-ear are numerous, and are natives of temperate climates in most parts of the world.

HARFLEUR (called in the middle ages *Hareflot*), a small t. of France, in the department of Seine-Inférieure, is situated near the mouth of the Lézarde, on the northern bank of the Seine, about 4 m. e. of Le Havre. The chief building is a beautiful Gothic church with an elegant tower, built by the English as a memorial of the victory of Agincourt. Pop. 1900, who are employed in fishing and the rearing of cattle. In former times, before the rise of Havre, Harfleur was a flourishing town, and was the key to the entrance of the Seine. Its harbor now forms a meadow. It was taken by the English under Henry V. in 1415, retaken by the French in 1433; in 1440 it was again seized by the English, and 10 years after was recaptured by Charles VII. of France. Off this town the duke of Bedford took or destroyed nearly 500 French ships, Aug. 15, 1416.

HARFORD, a co. in n.e. Maryland, bordering on Pennsylvania, bounded in part by Chesapeake bay and the Susquehanna; crossed by the Philadelphia, Wilmington and Baltimore railroad; 450 sq.m.; pop. '70, 22,605—4,855 colored. The surface is uneven, and the soil fertile; wheat, corn, oats, and pork are the chief products. Co. seat, Bel Air.

HARGRAVES, EDMUND HAMMOND, b. England, 1815. When 18 years old he settled in Australia. In 1849 he went to California, where he was so much impressed with the resemblance of the gold region to certain parts of Australia that he undertook to search for the precious metals in the latter country. He was successful, and was the first discoverer of Australian gold, for which he received rich presents and honors, the legislative council of New South Wales awarding him £10,000. In 1854 he returned to England and published *Australia and its Gold Fields*.

HARGREAVES, JAMES, whose name will ever be remembered in connection with the cotton manufacture of this country, as the inventor of the carding-machine and the spinning-jenny, was an artisan at Stanhill, near Blackburn, where he was born. Hargreaves was an illiterate man, and supported himself and family by weaving and spinning, carried on in his own house, according to the custom of the time. In 1760 he invented the carding-machine, as a substitute for the use of hand-cards; and four years later, he produced the spinning-jenny. Hargreaves had frequently tried to spin with two or three spindles at once, holding the several threads between the fingers of his left hand, but the horizontal position of the spindles frustrated his attempt. One of his children, however, is said to have upset the spinning-wheel while he was at work, and as he retained the thread in his hand, the wheel continued revolving horizontally, and the spindle vertically. The observation of these motions produced the thought, that if a number of these spindles were placed upright and side by side, many threads could be spun at once. Hargreaves now put his idea into practice, and the result was the *jenny*, at which he and his family worked, till the large amount of cotton which they spun having excited suspicion, his fellow-spinners, imbued with strong prejudices against machinery, broke into his house and destroyed his frame. He then removed to Nottingham in 1768, where he erected a spinning-mill. Two years later, he took out a patent for his machine; and discovering that it was in use by manufacturers in Lancashire without his permission, brought an action for £7,000 damages. Pending the trial, he was offered by a company £3,000 for the use of the jenny, but refused; and it having been proved that he sold some of his machines before the patent was obtained, it was thereby declared to have been invalidated, and his claim for compensation fell to the ground. Thus the inventor was but little benefited by his work. Hargreaves continued to carry on business as a yarn manufacturer, in conjunction with a Mr. Jones, with moderate success, till his death in April, 1778, when his share in the mill was bought by his partner for £400. His country never gave Hargreaves any reward for the invention to which so much of its wealth is due; yet it is but just to the memory of the late sir Robert Peel to state, that one of his last acts as a British minister, was to bestow on the youngest and only surviving daughter of this inventor, the sum of £250 from the royal bounty fund.

HARIKARI. See HARRI-KARI.

HÄRING, WILHELM, better known under the name of WILIBALD ALEXIS, a German novelist, was b. at Breslau in the year 1798. He was educated in Berlin, and served as a volunteer in the campaign of 1815. He afterwards studied law at Berlin and Breslau, but abandoned this pursuit for a literary career. After several poetical and other literary efforts Häring first made himself known over all Germany and abroad by his romance of *Walladmor* (2d edit. 1823–24), written in consequence of a wager with a friend that he would produce a work which should be mistaken for one of sir Walter Scott's. *Walladmor* was a most audacious mystification, and was greedily devoured in Germany as a production of the Scottish novelist. It was translated into various languages, among others into English by Thomas de Quincey (London, 1824), whose translation, however, departed so widely from the original, that it hardly deserved the name. Häring likewise wrote several admirable tales, but his chief excellence is displayed in the field of historical romance. His *Cabanis* (6 vols. 1832), notwithstanding

many defects, may be regarded as his best work; *Roland von Berlin* (3 vols. 1840); *Der falsche Waldemar* (3 vols. 1842); *Hans Jürgen und Hans Jochem* (2 vols. 1846); *Der Wärwolf* (3 vols. 1848); and *Ruhe ist die erste Bürgerpflicht* (5 vols. 1852), may likewise be classed among the first specimens of the historical romance in the German language. He died in 1871.

HARINGTON, Sir JOHN, 1561–1612; queen Elizabeth's godson. He studied at Eton and at Christ college, Cambridge, where he took the degree of M.A., his tutor being bishop Still, the famous author of *Gammer Gurton's Needle*. He came to London about 1583 and studied law, but queen Elizabeth seems to have transferred him to a place at court. It is said that it was at her command that he translated Ariosto's *Orlando Furioso*, 1591. In 1596 he published in succession *The Metamorphosis of Ajax; An Apology;* and *Ulysses upon Ajax;* the three forming collectively a very absurd and indecorous work of a pantagruelistic kind. In 1599 he served in Ireland under Essex, and was knighted on the field, to the annoyance, it is said, of Elizabeth. In 1608 he wrote a personal satire against the bishops, which he read to James I., but which was first published, by a Presbyterian printer, as late as 1653, under the title of *A Brief View of the State of the Church*. In 1613 his *Epigrams*, which had circulated widely in MS., were printed in a collection of verses of various writers entitled *Alcilia*, and separately in 1615. They became very popular and were often reprinted. The miscellaneous writings of Harington were collected by the rev. Henry Harington in 1779, in 2 vols., under the title of *Nugæ Antiquæ*. The *Nugæ* includes some very elegant pieces of poetry of the poet's father. The translation of *Orlando Furioso* was a very important labor, and it was carried out with skill and perseverance. Harington, however, was neither a very exact scholar nor a very poetical translator. The *Orlando Furioso* was a sumptuous book, illustrated in the best taste of the day, and to it were appended a prose critique of the poem, and a life of Ariosto compiled from various Italian sources.

HARIRI, ABU MOHAMMED AL KASIM BEN ALI, a most celebrated Arabic philologist and poet, b. at Bassorah, on the Tigris, in 446 H. (1054 A.D.). Little is known of his life and circumstances save that he was the son of a silk-merchant (whence his name Hariri—*harîr*, silk). Hariri wrote several valuable grammatical works, and his lyrics are of a high order. But the most famous of all his writings, and indeed one of the most famous compositions of all times and countries, is his book entitled *Makamchs* (Sittings). This may best be described as a novel, or a collection of rhymed tales, loosely strung together, the center of which is always a certain Abu Seid from Seruj, who, witty, clever, amiable, of pleasing manners, well read in sacred and profane lore, but cunning, unscrupulous, a thorough rogue in fact, turns up under all possible disguises, and in all possible places—sermonizing, poetizing, telling adventures and tales of all kinds—always amusing and always getting money out of his audience. The brilliancy of imagination and wit displayed in these strange adventures, their striking changes, and dramatic situations, have hardly ever been equaled; but more wonderful still is the poet's power of language. The whole force of the proverbial fullness of expression, spirit, elegance, and grandeur of the Arabic idiom, Hariri has brought to bear on his subject. His work—of which one of the greatest Arabic authorities has said that it deserved to be written in gold—has indeed become the armory as well as the mind of all Arabic writers since his day. Poets and historians, grammarians and lexicographers, look upon the *Makamehs* as the highest source of authority, and next to the Koran, as far at least as language is concerned. His book has been translated either entirely or partially into nearly every eastern and European tongue, has been the prototype of innumerable imitations, the most successful of which is the one in Hebrew, *Tachkemoni*, by Jehuda Al-Charisi. The first complete edition of the text appeared in Calcutta, 1809–14, in 3 vols.; another by Caussin de Perceval, in Paris, 1818; one much more valuable, chiefly on account of its commentary by Silvestre de Sacy, appeared in Paris, 1821–22 (re-edited 1847–53).

The first (Latin) translations in European tongues of single Makamehs were made by Golius (1656) and Schultens (1731, etc.) But the palm of all translations is due to Rückert, who, with a power only inferior to that of Hariri himself, has so completely reproduced the spirit and form of the work in German in his *Verwandlungen des Abu Seid b. Serug*, first published in 1826, that the *Makameh* itself has become a favorite form for similar compositions in Germany. English translations, but which fall far short of the German one, were published in 1767 by Chapellon, and in 1850 by Preston. Munk and De Sacy have rendered some portions into French.

HARISCHANDRA, a Hindu king of the solar dynasty, a descendant of Ikshwâku, and one of the more prominent personages in the legendary history of ancient India. The earliest mention is made of him in the *Aitâreya-Brâhmana* (see VEDA), where he is the subject of one of the most interesting legends of the Vedic period. He is represented there as desirous of obtaining a son, and of making a compact with the god Varuna, by which he promised to sacrifice to the god his son, if he granted him one. Varuna acceded to his prayer, and the *Aitâreya-Brâhmana* then proceeds to relate how Harischandra delayed, from time to time, the fulfillment of his part of the compact, until at last he succeeded in finding a substitute for his son in S'unahs'epa, who was sold to him by his father for 100 cows, to be offered in sacrifice to Varuna. Ultimately,

however, S'uanahs'epa becomes released from his bondage through the intervention of the gods. (See S'UANAHS'EPA). According to the epic poem *Mahâbhârata*, Harischandra was a type of munificence and piety, and after death became elevated to the court of Indra; and some of the Purânas are still more explicit on his wonderful fate. Having given his whole country, his wife and son, and finally himself to Vis'wâmitra, in satisfaction of the demands made by this greedy priest for his assistance at a sacrifice, Harischandra, in consequence of this pious act, became elevated with his subjects to the paradise of Indra; but, having been insidiously misled by Nârada to boast of his merits, was again precipitated. The repentance of his pride, however, arrested his downward descent, and he and his train paused in mid-air, where his city is popularly believed to be at times still visible.—See Wilson's translation of the *Vishnu Purâna*.

HARIVANS'A, a Sanskrit epos of some extent, which professes to be part of the Mahâbhârata, but may be more properly classed with the Purânas. It is chiefly occupied with the adventures of Vishnu, in his incarnation as Krishna, but treats likewise of the creation of the world, of patriarchal and regal dynasties, and other matter contained in Purânas. Although it is frequently quoted by later writers, it is not a compilation of much reliability.—See PURÂNA.

HARLAN, a co. in s.e. Kentucky on the Virginia border, drained by Cumberland river; 500 sq.m.; pop. '70, 4,415—99 colored. The surface is hilly with extensive forests. Corn and pork are the main products. Co. seat, Harlan.

HARLAN, a co. in s. Nebraska bordering on Kansas, intersected by Republican river; 576 sq.m.; pop. '76, 2,140. The surface is undulating, and there is very little forest land; soil fertile. Co. seat, Alma.

HARLAN, JAMES, b. Ill. 1820; graduated at Asbury university, and took to the legal profession. He was superintendent of public instruction for the state of Iowa in 1847; in 1853 president of the Iowa Wesleyan university; from 1855 to 1865 U. S. senator from that state; in 1865–66 secretary of the interior, and again senator from 1867 to 1873.

HARLAW, BATTLE OF. From the beginning of the 12th c. to the beginning of the 14th c., the power and territory of the Celtic tribes in Scotland steadily gave way before the encroachments of the Anglo-Normans of the Lowlands. But during the long wars of the succession, and the feeble reigns of the first and second Stuart kings, the Celtic people regained so much of what they had lost, that, strengthened by alliances with England, they began to be regarded with alarm by the Scottish government. A trial of strength seemed inevitable, and it was precipitated by a dispute as to the right of succession to the earldom of Ross, between Donald lord of the Isles and a brother of the regent Albany. The island chief, gathering a host of 10,000 Islesmen and Highlanders, marched rapidly southwards, leaving havoc and desolation behind him. The rich city of Aberdeen, and the whole country to the n. of the Tay, seemed to be within his grasp, when he was encountered by a vastly inferior force of the chivalry and men at-arms of Mar, Garioch, Buchan, Angus and Mearns, under Alexander Stewart, earl of Mar, one of the best captains of the day, familiar in his youth with the usages of Highland warfare, and more recently distinguished in the wars of France and Flanders. The armies met on the eve of St. James (July 24), 1411, at Harlaw, a low table-land on the banks of the Ury, about 18 m. to the n.w. of Aberdeen. The battle was long and bloody, but the Highlanders were at last driven back. They left two chiefs—Maclean and Macintosh—and more than 900 dead upon the field. The loss upon the other side was computed at 500 or 600, among whom were the constable of Dundee, hereditary bearer of the royal banner, sir Alexander Irvine of Drum, and other knights, many of the best esquires of Angus and Mearns, nearly all the gentry of Buchan, and Robert Davidson, the provost, and many of the burghers of Aberdeen. So obstinate and sanguinary was the struggle, and so greatly were the Lowlanders outnumbered, that few of them escaped without a wound. The conflict made a deep and lasting impression on the national mind. For more than a hundred years, the battle of Harlaw continued to be fought over again by school-boys in their play. For more than two hundred years it was remembered in the music of the people. It lived still longer in their traditions; and it is not yet forgotten in their poetry. It is the subject of a still popular ballad, written, it would seem, towards the end of the 16th c., printed at least as early as 1668, reprinted in Allan Ramsay's *Evergreen* in 1724, and included in most subsequent collections of Scottish ballads. Scott, in his *Antiquary*, has commemorated "the sair field of Harlaw" in a fine fragment of song.

HARLAY, ACHILLE DE, 1536–1616; b. France, of an old and celebrated family. He was distinguished as a jurist, and succeeded De Thou (whose daughter was his wife) as president of the parliament of Paris. He wrote *La Coutume d'Orleans*.

HARLAY DE SANCY, NICOLAS, 1546–1629; b. France; superintendent of finances and ambassador under Henry III. and IV. D'Aubigné satirized him on account of his frequent change of religious faith; but he is best known as the owner of the large jewel called by his name—the Sancy diamond.

HARLEIAN COLLECTION, certain ancient pamphlets and manuscripts in the British museum, collected by Robert Harley, earl of Oxford, at the beginning of the

18th century. The collection (8,000 MSS. and 400,000 pamphlets) was bought by the government in 1723 for $50,000. Several volumes of selections from these papers have been published under the title of *Harleian Miscellany*.

HARLEM.—See HAARLEM, *ante*.

HARLEM, or HAARLAEM, now part of the 12th ward of New York city, but originally a separate settlement. Down to about 1760 it was a quaint Dutch village mainly of private residences, surrounded by gardens and farms, and noted for abundance of shade trees, and the sleepy quietness so quaintly described by Washington Irving in his *Knickerbocker's History of New York*.

HARLEM RIVER, a tidal stream from the East river around the upper or n. end of New York island, passing by a narrower channel called Spuyten Duyvil creek into the Hudson or North river, navigable, for a portion of its course, to large vessels.

HAR'LEQUIN, CLOWN, PANTALOON', and COL'UMBINE, the four chief personages in the modern Christmas pantomime. This species of play is divided into two parts—the one, the introduction, or opening; the other, the harlequinade. Both divisions of this kind of play, but particularly the opening, were wont to be acted in dumb-show, and at one time the same performers used to play all through the piece; the idea of which was a story of love, interspersed with grotesque elements. At a certain stage of the plot, a fairy was employed to transform the tyrant and his abettor into Clown and Pantaloon, and the lovers into Harlequin and Columbine; and the motley quartette were sent away for a period on a tour or chase, the termination of which took place at the will of the good fairy. During this chase, the object of the Clown ought to be the capture of Columbine; but Harlequin, who is provided by the fairy with a magic sword, the loss of which renders him helpless, is usually able to thwart all his designs, and protect his mistress. A symbolical meaning may, no doubt, be found at the bottom of such representations, at least in many of their parts; but as, in their modern form, they are a jumble of fragments from older scenic entertainments, anything like a consistent scheme is not to be looked for. As to the characters, the prototypes of the Clown and Harlequin may be traced back to the Roman Atellanæ (q.v.). The arlechino (Fr. *arlequin*) of the early Italian dramatic entertainments was a satirist and practical jester of a similar type to the modern English Clown. As civilization advanced, the character gradually became more refined, then was confined to the ballet, and at last disappeared from the regular stage. He still figures in the improvised plays of the Italians. In English pantomimes, the Clown is the prime mover in the "comic business;" and there are often two, the "talking" Clown, and the "tumbling" Clown, who acts chiefly as an acrobat. The Clown is also a never-failing adjunct in circus entertainments. Pantaloon is usually represented as a very senile old man, the butt of the Clown, and the aider and abettor of that person's comic villainy. This personage is knocked about and well cuffed by every one; he generally, therefore, wears a stuffed dress, in order to protect himself from accident. Columbine, the lover of Harlequin, has nothing to do all through the piece but to dress well, look pretty, and dance her best. The character of Columbine is usually represented by a well-trained dancer. Harlequin wears a tight dress sewn over with spangles.

The persons engaged in these occupations require to be trained to it from infancy. To make a good Clown or Harlequin (in the continental and original sense of the word) requires decided genius; and though the rôle may seem the lowest in the dramatic art, lasting European reputations have been obtained in it, as by the English clown, Grimaldi, and the famous French Carlin (1713–83).

HARLEQUIN DUCK, *Clangula histrionica*, a species of Garrot (q.v.), which receives its name from its variegated markings, chiefly white, gray, and black. It inhabits the arctic regions, where it is found, not only on the sea, but on lakes and rivers. It is a rare winter visitor of the British islands. In America it is pretty plentiful in winter as far s. as the bay of Fundy. Its whole length is about 17 inches.

HARLESS, GOTTLIEB CHRISTOPH ADOLF, D.D.; b. Germany, 1806; graduated at the university of Erlangen in 1829, and a few years afterwards became professor of theology in that institution. In 1842 he was in the Bavarian diet, and vigorously opposed the order requiring all persons in or connected with the army to kneel on the passing of the sacramental host. For this opposition he was removed from the university, but made a counselor of the consistory at Baireuth. Soon afterwards he was professor of theology at Leipsic, pastor and court preacher, and in 1852 was made president of the Protestant consistory at Munich, and a member of the Bavarian council of state. He has published a number of works on religious themes.

HARLEY, ROBERT, Earl of OXFORD AND MORTIMER, the son of sir Edward Harley, an active partisan of the parliament during the civil wars, and descended from an illustrious Herefordshire family, was b. in London in 1661. Harley entered parliament, being returned for the Cornish borough of Tregony, as a whig; but he soon began to vote and speak against his party; and policy and ambition, rather than choice, made him an anti-dissenter and an ardent tory. He shortly acquired a great reputation for his knowledge of parliamentary law and practice, a study not much pursued in those days; and in the parliament, which met under the chieftainship of Rochester and Godolphin,

in Feb., 1701, he was, by a large majority, elected speaker. Harley retained his post, having been twice re-elected, till April, 1704, when he became secretary of state. The conviction of Harley's secretary for treasonable correspondence with France caused his master, though entirely exculpated, to resign his office in Feb., 1708. Harley remained out of power two years, long enough, with the assistance of Mrs. Masham, to completely undermine the power of the whigs. In Aug., 1710, Godolphin was dismissed, and Harley was appointed to his post of chancellor of the exchequer, and brought back the tories. An event occurred in 1711, which raised Harley to the acmé of popularity. A French priest and spy, who assumed the title of marquis de Guischard, being brought before the council on Mar. 8, on the charge of treasonable correspondence with France, rushed upon Harley, and stabbed him with a penknife. His life was said to have been in danger, and recovering, he was congratulated by parliament on his escape, created earl of Oxford and Mortimer, decorated with the garter, and in the following May appointed lord high treasurer of Great Britain. From this point, Harley's course was downwards: he was not a man of business, and was destitute of that indispensable quality for a premier—decision of character. Macaulay had but a mean opinion of Harley as a statesman, yet he gives him, as a man, a higher character than could be given to any other politician of the time. The principal act of Harley's administration was the treaty of Utrecht: though England might have obtained better terms, she had nothing to gain from a continuance of the war; and the peace was, at all events, popular. Harley ceased to pay court to lady Masham, and the unscrupulous Bolingbroke succeeded in getting him dismissed on July 27, 1714. Lord Oxford was dismissed on Tuesday—Bolingbroke became premier—and the queen died on Sunday. George I. was proclaimed, and Bolingbroke fled to France, but Oxford remained to meet his fate. He was sent to the Tower, and after two years' imprisonment brought to trial: the two houses quarreled as to the mode of procedure, and the commons having in anger refused to take any part in the trial, he was acquitted by the peers, and released. He spent the remainder of his life in retirement—the friend of scholars and men of letters—the founder of a collection of books and MSS. which perpetuates his name—and died May 21, 1724.

HAR'LINGEN (Frisian, *Harns*), a flourishing seaport of the Netherlands, in the province of Friesland, on the Zuyder Zee, about 65 m. n.n.e. of Amsterdam. It is protected from the inroads of the sea by a strong and high dike. Principal buildings are the town-house and the great church. Harlingen has a grammar and a drawing school. There is a large shipping trade. Other industries are refining salt, tanning, soap-boiling, ship-building, making sail-cloth and brick. Timber, grain, and hemp are brought from Norway, and immense quantities of butter, cheese, flax, etc., are sent to England, from which in return are imported coal, iron, cotton, yarns, manufactured goods, etc. Pop. '75, 10,840.

HAR'MALINE AND **HARMINE** are vegetable bases occurring in the husk of the seeds of the *Peganum harmala*, or Syrian rue, a plant that grows abundantly in the steppes of southern Russia, and whose seeds are used in dyeing silk, to which they impart various shades of red. *Harmaline* ($C_{26}H_{14}N_2O_2$), when pure, crystallizes in colorless prisms; but its salts are yellow, and oxidizing agents transform it into a red coloring matter, which combines with acids, forming salts, which constitute the basis of the *harmala red* of commerce. *Harmine* ($C_{26}H_{12}N_2O_2$) may be obtained by oxidation from harmaline. It crystallizes in delicate prisms, and forms colorless salts.

The *Peganum harmala* belongs to the natural order *zygophyllaceæ*. It is a half-shrubby plant, with smooth linear pinnate or bipinnate leaves, and solitary white flowers. The seeds are said to possess narcotic properties, and the emperor Solyman is reported to have kept himself intoxicated by eating them. They are used by the Turks as a spice.

HARMAR, JOSIAH, 1753–1813; an officer in the war of independence, serving under Washington 1777–80, and in 1781 under Greene, becoming col. of the first U. S. regiment in 1783. He was the bearer to France of the notice of the ratification of the treaty of peace. Finally, after service as Indian agent, in 1789, he was appointed general-in-chief of the army of the new republic.

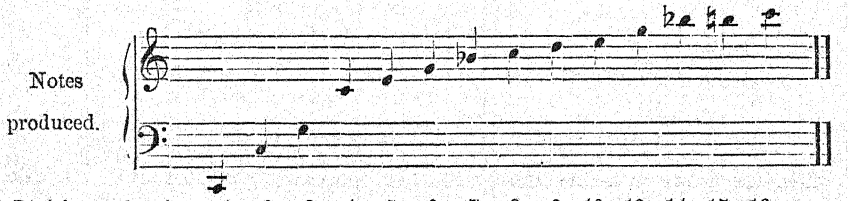
HARMAT'TAN, a dry hot wind, prevalent on the Guinea coast during Dec., Jan., and Feb., blowing from the interior to the Atlantic ocean. It is generally accompanied by a fog, through which the sun appears of a pale-red color. It has a hurtful effect on vegetation, and also unpleasantly effects the human body, drying up the eyes, nostrils, and mouth, and even causing the skin to peel off. It, however, has the good effect of checking epidemics, and curing dysentery, fevers, and cutaneous diseases. The harmattan is the same as the sirocco (q.v.) of Italy.

HARMO'DIUS AND **ARISTOGEI'TON**, two Athenians strongly attached to each other, who murdered (514 B.C.) Hipparchus, the younger brother of the "tyrant" Hippias, on account of an insult offered by him to the sister of Harmodius. They meant to kill Hippias also, with a view to the overthrow of the Pisistratidæ, but in this they did not succeed. Harmodius was cut down by the body-guard immediately after the murder of Hipparchus. Aristogeiton fled, but was afterwards taken and executed. As Hippias

was banished from Athens a few years later, Harmodius and Aristogeiton naturally came to be regarded as patriotic martyrs; and in this light they appear in all subsequent Greek history. They received divine honors from the Athenians, and had statues raised to their memory. A very beautiful drinking-song on this subject has come down to us in the Greek Scholia.

HARMONIA, wife of Cadmus, said to have been the daughter of Zeus and Electra, while her brother Iasion was the founder of the mystic rites which were celebrated annually on the island of Samothrace. When Cadmus came there, and was initiated, he received Harmonia as his wife. The gods honored the wedding with their presence; Athene presented the bride with a peplus and necklace; Electra gave the mystic rites of the mother of the gods. According to the scholiast on Euripides, Cadmus, with the aid of Athene carried off Harmonia; and in the mysteries, the lost Harmonia is regularly sought for. We have here an exact parallel to the Eleusinian legends. Electra and Harmonia are mere varieties of Demeter and Core. Cadmus like Pluto carries off the bright daughter of the goddess to the world below to spend there the dreary winter. Hence, in the Theban tale, Cadmus and Harmonia leave Thebes to go away among the Encheleis; the snake people are themselves changed into serpents, and are finally translated to the elysian fields. We then understand, too, why (according to Pausanias, ix. 16, 5) Cadmus dwelt at Thebes in the temple of Demeter Thesmophoros. The necklace, wrought by Hephæstus, which Harmonia received as a marriage gift, may be compared with the cestus of Aphrodite; for it is difficult to draw a line between Harmonia or Core and Aphrodite. Then it seems to be mythic representation of some phenomenon like the halo of dawn or the rainbow. Like the works of the German dwarfs, this necklace carried with it ill-luck, and the legends give it a history of woe. With it Polynices bribed Eriphyle to betray her husband Amphiaraus. It brought death at last to her son Alcmæon. Dedicated in the temple of Athene Pronoia at Delphi, it was given by the tyrant Phayllus (352 B.C.) to his mistress; her son going mad, set fire to the house, and she perished in the conflagration.

HARMONICS, the accessory, or concomitant sounds which are produced by a fundamental musical sound, either naturally, or by a division into aliquot parts. Every musical sound, although to the ordinary ear it appears to be only one sound, will, on close observation, be perceived to consist of a principal or fundamental sound, accompanied by other feeble acute sounds in perfect harmony (see HARMONY). The existence of such accompanying sounds, which are called harmonics, can be best demonstrated by the vibrations of a string stretched between two points, or bridges. Eight feet is a good length for such a string, although 16 ft., or even 32, would be better, from bridge to bridge. A scale or measure, accurately dividing the length of the string into aliquots parts, from $\frac{1}{2}$ up to $\frac{1}{16}$, is placed alongside of it. When a violin-bow is drawn across the string it vibrates from end to end, and gives out its fundamental sound. Divide the string into halves by slightly touching it with the finger at the mark $\frac{1}{2}$ on the scale, or better, with a stretched thread lightly pressed upon it at that point; when sounded, it will be found to vibrate in two halves, each part vibrating as fast again as the entire string, and producing a sound an octave above the fundamental one, or as 2 to 1. Divide in the same manner at $\frac{1}{3}$, and the sound produced is the fifth above the last octave, being in the proportion of 3 to 2. It is not necessary to touch the string on more than one of the points of the division, for the long side of the string always divides of itself naturally, which can be seen by the eye. The parts where the string seems at rest, are called the nodal points. Divide as before at $\frac{1}{4}$, and the second octave above the lowest sound is heard, being to the first octave as 4 to 2. At $\frac{1}{5}$ the major third above the last octave is found, being as 5 to 4. At $\frac{1}{6}$ the octave of the former fifth, 3 to 2. At $\frac{1}{7}$ we find the true flat seventh, or 7 to 4; at $\frac{1}{8}$, again the octave of the lowest; at $\frac{1}{9}$ the major second, or 9 to 8; and above this, at $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{14}$, we find the octaves of the major third, the fifth, and the flat seventh; while at $\frac{1}{15}$ we obtain the sharp seventh, or 15 to 8; and at $\frac{1}{16}$ another octave of the fundamental sound. The following is the order in which the harmonics arise, assuming that the string, at its full length, sounds the note C on the second ledger line below the bass staff, or lowest string on a violoncello.



Divisions of string,	1	2	3	4	5	6	7	8	9	10	12	14	15	16
	C	C	G	C	E	G	B♭	C	D	E	G	B♭	B♮	C

From these harmonics, the true ratios of all the intervals of the diatonic scale, in relation to a fundamental key-note, are found, and in the most perfect tune; they are as follows:

Degrees of the scale	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Notes of the scale	C	D	E	F	G	A	B	C
Ratios to key-note	1	$\frac{9}{8}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	$\frac{15}{8}$	$\frac{2}{1}$

Assuming 24 as the number of vibrations of C in any given time, the other notes of the scale may be expressed in whole numbers thus:

Notes of the scale	C	D	E	F	G	A	B	C
In whole numbers	24	27	30	32	36	40	45	48

In the artificial division of the octave into a chromatic scale of twelve equal semitones, all the intervals must necessarily be made somewhat imperfect, which is called temperament (see TEMPERAMENT). This must be especially attended to in keyed instruments. Singers, and performers on stringed instruments, are guided by their ear, being free from the fetters of fixed notes, to which keyed instruments are necessarily subject. Even in the natural diatonic scale as produced by the harmonics, it will be found, on analysis, that a certain degree of temperament is required to make the fifths within the octave equal. For example, the fifths from F to C, and from E to B, will be found to be accurately the same as the fifth from C to G—viz., $\frac{3}{2}$; which is easily ascertained by reducing their respective numbers to the lowest fraction; thus, F to C is $\frac{48}{32} =$ to $\frac{3}{2}$; from E to B is $\frac{45}{30} = \frac{3}{2}$; while from D to A, which in practical music must also be treated as a fifth, will be found to be too flat; thus, D to A is $\frac{40}{27}$, which cannot be reduced to $\frac{3}{2}$; but when both are brought to the fractions of a common denominator, which is done by multiplying $\frac{40}{27}$ by $2 = \frac{80}{54}$, and $\frac{3}{2}$ by $27 = \frac{81}{54}$, it is shown that D to A, in the scale of nature, is flatter than a perfect fifth, in the proportion of 81 to 80; so that without temperament A cannot at the same time be a perfect major sixth to C, as a key-note, and also a perfect fifth to D, the true major second of C.

HARMONICA, a musical instrument of a fascinating quality of sound, invented by Benjamin Franklin, the sound of which was produced from glass in the shape of a cup, or half globe, which was put into a revolving motion on its center, while the rim was touched by the finger. Franklin, in a letter dated July 13, 1762, to padre Baccaria, at Turin, mentions the history of his invention. It had already been known that beautiful sounds could be produced by friction of the finger on the rim of an ordinary drinking glass. An Irishman, named Puckeridge, was the first who hit on the idea of playing airs on a row of glasses, which he tuned by putting water into each. He performed publicly in London; but he and his glasses were burned in the great fire in London in 1750. When Franklin finished his invention, he found an excellent performer in a Miss Davis, to whom he made a present of his harmonica. Miss Davis, in 1765, performed on the harmonica in Paris, Vienna, and all the large cities of Germany with great effect. This fascinating instrument found many admirers, but none of them ever succeeded in improving it. The compass of its notes was from C to F, including all the chromatic semitones. The producing of the sound by the points of the fingers produced such an effect on the nerves of the performer as in some instances to cause fainting fits. All attempts to make the harmonica, through means of keys, easier for amateurs, ended in failure, as no substance was found to act as a substitute for the human finger, which doubtless imparted an expression to the sound which no dead substance could possess. The harmonica gave rise to a host of similar instruments by Chladini, Kaufmann, Rieffelsen, and others, which were not eminently successful. Other instruments of no merit or importance took the same name, but had not the most remote resemblance to the original. The harmonica was somewhat similar to the instrument now known as musical-glasses.

HARMONICA, CHEMICAL. This term is applied to the musical note which is evolved when a long dry tube, open at both ends, is held over a jet of burning hydrogen. A rapid current is produced through the tube, which occasions a flickering, and is attended by a series of small explosions that succeed each other so rapidly, and at such regular intervals, as to give rise to a musical note, whose pitch and quality vary with the length, thickness, and diameter of the tube. The explanation of this phenomenon, which was discovered by Lampadius, but long remained unaccounted for, is due to Faraday. A curious modification of the experiment is given by Böttger, in the 94th vol. of Poggendorff's *Annalen*, 1855.

HARMONIC PROPORTION. Three numbers are said to be in harmonic proportion when the first is to the third as the difference between the first and second is to the difference between the second and third, otherwise harmonic proportion is that which subsists between the reciprocals of numbers which are in arithmetical proportion. Thus, 3, 5, 7, etc., being in arithmetical proportion, $\frac{1}{3}$, $\frac{1}{5}$, $\frac{1}{7}$, etc., are in harmonic proportion. In geometry, a line AB is said to be harmonically divided when two points

A C B D

are taken, one in the line, and the other in the line produced, as C, and D; such that AC: CB:: AD: DB. When the line is thus divided, AD, CD, and BD, are in harmonic proportion. A harmonic progression is a series of numbers in harmonic proportion, as the series formed by the reciprocals of numbers forming an arithmetical series.

HARMONIC STOPS designate those stops of a large organ which are composed generally of more than a single rank of pipes, tuned in octaves, double octaves, and double or triple thirds and fifths above the natural pitch of the keys; they comprise the mixture, furniture, cornet, etc. Harmonic stops which have only a single rank of pipes tuned in thirds, fifths, with their octaves above the pitch represented on the key-board, are called "mutation stops." They were introduced to give additional power to the "foundation stops," and also to produce a more brilliant effect in the performance of certain styles of music.

HARMONISTS, a sect founded at Würtemberg by George and Frederick Rapp about 1787. The points of belief of the sect, as finally elaborated, are these: Adam was created a dual being, having within his own person both the sexual elements, and the Creator is of the same dual nature; if Adam had been satisfied to remain in his own original race he would have increased without the aid of woman, and brought forth beings like himself, but he became discontented, and then the Creator separated his twofold nature, of the female element making woman to gratify Adam's desire, and therein consisted the fall of man; that the condition of celibacy is the most pleasing to God; that in the renewed world man will be restored to his dual God-like and Adam-like condition; that the coming of Christ and the renovation of the world are near at hand; that we should be in constant readiness for this reappearance; that Jesus was of a dual nature, like Adam before the fall; that Christ taught a community of goods; that ultimately all mankind will find salvation;—but only those who are celibates, and otherwise conform to what they believe to be the commandments of Jesus, will be at once received into the company of Christ and his companions, and that offenders must undergo a probation for purification. They positively reject what is called spiritualism. The early members were so much harassed by petty persecutions, chiefly from the regular churches, that in 1803 they determined to emigrate, and came to Pennsylvania and Maryland. In 1805 they were firmly and prosperously established at Harmony, Butler co., Penn., where they remained ten years. Then they migrated to New Harmony, Ind., remaining there until 1824, when they sold their land to Robert Owen, the socialist, and returned to Pennsylvania, establishing themselves at Economy, Beaver co., 17 m. n.w. of Pittsburg. Here they have grown in wealth and decreased in numbers, for they have of late years sought no accessions. There are probably not more than 100 in the neat little village, and nearly all are old men. The German language is still used. They have much property in real estate, in coal mines, and they control, at Beaver Falls, the largest cutlery manufactory in the country.

HARMO'NIUM, a musical instrument of modern invention, for which there are many claimants. The principle by which the sounds of the harmonium are produced, is called the *free vibrating reed*, supposed to have been a modern discovery, but now ascertained to have been known in China long before it was ever heard of in Europe. Its construction is as follows: A narrow rectangular slit being made in a piece of brass plate of a quarter of an inch in thickness, a thin elastic spring of the same metal, and of nearly the exact breadth of the slit, is fixed at one end by two small rivets to the surface of the plate, close to one end of the slit, being so adjusted as to fill the area of the slit, and that when pressed into it at the free end it may pass inwards without touching the end or the sides of the slit, and when left to itself it shall return back to its position of covering the slit. The spring at the free end is permanently bent a very little outwards. When a current of air is forced through the slit, the spring is put into vibration, and produces a continuous musical sound, acute or grave, according to the rapidity or slowness of the vibrations. This kind of reed is termed "free," in contradistinction to the reed of the organ-pipe, the spring or tongue of which entirely covers an oblong slit, in the side of a brass tube closed at one end, and vibrates against the cheeks or outside of the slit, instead of within it. After many attempts, in various countries, to construct a keyed instrument of really a useful kind with the free reed, Debain of Paris produced his invention of the harmonium, which became more or less the model of all the others that have followed. The harmonium occupies comparatively but little space, being only about 3 ft. 3 in. high, and 3 ft. 9 in. broad; the depth being according to the number of the stops. It has a compass of five octaves of keys from C to C, the key board being placed on the top, immediately below the lid. Under the key-board is the wind-box, on which are valves for each key; while below the valves, and inside of the wind-box, the different rows of reeds are placed. The sizes of the reeds differ, according to pitch, from about 3½ in. long to ¼ in.; and the quality of sound is affected and modified by the breadth of the vibrating part of the reed, and the shape of the aperture in the wind-box covered by the valve. The pressure of wind is from a bellows with two feeders, which the player moves alternately with his feet, filling a magazine, similar to the bellows of a small organ. When a key is pressed down, the valve below it opens, and the wind, which has access from the bellows to the wind-box, rushes through the slit of the reed, and produces a sound which continues while the valve is kept open. It is a peculiarity of the free reed that an increase or diminution of the pressure of wind does not alter the pitch of the sound, but merely increases or diminishes its volume. Advantage is taken of this peculiarity to effect, in the harmonium, a beautifully expressive swell, or diminution in the sound, by gradually increasing or

diminishing the pressure of the wind. The vibrations of the spring being like those of a pendulum, isochronous, remain fixed in rapidity or slowness, according to the length and elasticity of the vibrating slip of metal, and thus regulate the pitch of the sound without reference to the pressure of wind. For the deep bass-notes the springs are heavily loaded at the loose end, to make them vibrate slowly; while in the higher notes they are made thinner at that end. Harmoniums are made of various sizes, and from one row of reeds (or vibrators, as they are now called) to four or more rows; each row is divided near the middle, between an E and F; and each half has its separate draw-stop. Lately, a "knee" movement, erroneously called a pedal, for producing a small degree of crescendo on either bass or treble, has been attached. Some harmoniums are made with two rows of keys, thus affording a greater variety in playing solo with an accompaniment; and for more skillful performers, pedal-keys for the feet, like those of a church organ, are added. The manufacture of the harmonium in Paris has, of late years, increased almost incredibly. The various parts of the harmonium can now be got made there, and furnished from a single reed to a complete set. Many attempts were formerly made in England to accomplish the making of a similar instrument called the seraphine, but it was a much inferior instrument, although more expensive. Even now, the harmoniums said to be made in this country, are all got piecemeal from Paris, and put together in London. The best makers in Paris are Debain and Alexandre; and in Germany, Schiedmayer of Stuttgart, and Kaufmann of Dresden. The latter is the inventor of the *percussion action* for the harmonium, which consists of a small hammer like that of a pianoforte, which strikes a blow on the vibrator the moment the key is pressed down, and sets it instantly into vibration, thus assisting the action of the wind. Harmoniums may now be had of various sizes and qualities, at prices from £5 to £50. Valuable chiefly for accompanying psalmody, they suitably take the place of organs in temporary places of public worship, or among the less opulent class of congregations. For domestic use, they are not likely to supersede the pianoforte, but possessing the important advantage of not going out of tune through humidity of atmosphere, they will be found available where pianos cannot properly be kept.

HARMONY (Gr., a joining or fitting of pieces into one another), in Music, is understood to be the union of sounds which individually appear different, but when heard together, form a collective sound called a chord (see CHORD); or it may be explained as the melting or flowing together of several sounds into, as it were, one sound; in consequence of, or arising from, the consonant nature of their relative proportions to a fundamental sound. All musical compositions can be reduced to a fundamental harmony of successive chords, which, in their progression, are regulated by the rules of the theory of music. Dissonant as well as consonant, chords are included as forming harmony, as they are a union of several sounds that have but one fundamental sound, or bass note, in common. The harmony of chords can either be close or spread, which the position or distance of the sounds or intervals from one to another, forming the chords, determines. Close harmony is when the sounds composing each chord are placed so near to each other, that no sound belonging to the chord could again be interposed between any of those already present. Spread harmony is when the sounds of a chord are placed at a greater distance from each other, so that some of them might be again interposed between the parts of those sounds already present. Close harmony generally takes place in music in which there exists a near relationship among the different parts, as in compositions for four male voices, in which case it becomes unavoidable, and spread harmony impossible. In choruses for mixed voices, and in instrumental compositions, spread harmony is more used, and the intervals of the chords are frequently inverted, which produces what is called double counterpoint (q.v.) In the inversion of intervals, great care must be taken to avoid a consecutive progression of such intervals as become fifths by inversion; also that an alto part should never approach nearer a bass part than the distance of an octave. Close and spread harmony are often mixed, in order that individual parts may become more melodious and easier to sing, as well as to prevent unpleasant or abrupt skips in the melody; or to avoid an equally faulty monotonous formality of movement.

Although it has been said that every chord, whether consonant or dissonant, forms harmony, it must not be understood that any combination of sounds which one may choose to sound together is harmony. A dissonant chord treated as harmony is always judged of according to the nature of its different intervals, of which there are often some that are treated as dissonances, although they are fundamentally consonances, only more or less imperfect. All harmony in music is derived from what are called the aliquot tones. When a string is made to vibrate, we at first think that we only hear one sound; but on closer and more careful observation, we easily discover that the fundamental sound, particularly when it is a deep one, is accompanied by others in the most perfect harmony. The accompanying sounds are exactly those of which the chords in music are formed, and on which the foundation of the whole system of harmony in music is built. From the mathematical proportions and the relations of the accompanying sounds to the fundamental or principal sound from which they all arise (see HARMONICS), it follows that harmony, in its first and natural state, can only be in four parts and it is then called perfect, or complete; in opposition to harmony of two or

three parts which cannot be complete, as some of the intervals of the chords, essential to characterize the key or scale, may be awanting. A four-part harmony may be so arranged that five, or even more parts may appear, by means of doubling one or more of the intervals in the octave. From this increasing of the parts arises what is called the subordinate harmony, accompanying the principal or fundamental. In order to avoid faulty progressions in the subordinate harmony, care must be taken to strictly observe the rules which apply to the intervals in their fundamental state. The purpose of the subordinate harmony is only that of ornamenting the original, which the Germans call *figurirung*, commonly called figured harmony, but should be more properly called florid counterpoint. If it be admitted that the intervals and chords that are most consonant are also most harmonious, it naturally follows that the union of similar sounds must be the most perfect, therefore the order of perfection in which they rank must arise from their mathematical proportions in relation to the fundamental sound or unison. The common chord of a third, fifth, and octave to a bass note is the most pure and perfect harmony; after which follow the chord of the seventh, and the chord of the ninth. The inversions of any of these chords are all in various degrees less perfect than their original fundamental harmony. The position of the intervals in respect to the fundamental note is also an element in the purity of chords; as, for example, a chord of the seventh in close harmony, is far less satisfactory and pleasing than it is in spread harmony, where the different intervals are at, or near, their natural distances from the fundamental note. Such considerations are of great importance to the musician who has to accompany from a figured bass; and also to organ-builders in arranging the composition of mixture-stops. Harmony in modern music, is therefore a succession of chords according to certain laws. In the early ages of the science, the laws of harmony were most arbitrary. Nature presents us with solitary chords, but she does not establish their succession. A collection of chords is not music, any more than a collection of words is a speech. Music, like a discourse, must also have its phrases, periods, punctuation, etc., and all in harmony. The most useful works on harmony are those of Dr. Marx, professor Dehn, and Dr. Fred. Schneider.

HARMONY OF THE **GOSPELS.** The narratives of the evangelists, and especially those of the first three, are in many things close repetitions of each other, and not unfrequently relate the same incident in words which are all but identical. On the other hand, they occasionally exhibit seemingly grave discrepancies, whether of facts or of circumstances; one relating an occurrence not noticed by another, or placing an occurrence at a time or in circumstances which it is hard to reconcile with the narratives of his brother-evangelists. At a very early period of Christian literature this difficulty was felt, and with a view to its more complete and easy elucidation, the passages of the several gospels which bore upon each subject or incident were collected for the purpose of comparison and of mutual illustration. The title under which the earliest compilation of this nature, which dates from the second half of the 2d c., was known was *Diatessaron*, because it consisted of extracts from the *four* evangelists. The author of this compilation was the heretic Tatian, and it is remarkable that, in order to give a color to his own peculiar opinions as to the unreality of the flesh of our Lord, he omitted from his collection the entire history of the birth and childhood of Jesus as related by Matthew and Mark (Eusebius, *Eccl. Hist.* iv. 29). St. Jerome states that a similar harmony was compiled about the same time by Theophilus of Antioch, although no trace of such a work is now discoverable; but in the middle of the following century the celebrated Neo-platonist convert, Ammonius Saccas, undertook a new *Diatessaron*, which formed the basis of the well-known *Ten Indexes*, or canons, of the Harmony of the Gospels, in the Greek text, by Eusebius, which were afterwards adapted to the Latin text by St. Jerome, and continued to be used as a key to the concordance of the gospels by readers both of the Greek and of the Latin text, down to the 16th century. The canons of Eusebius consist of ten tables. Of these, the first, which contains four columns, exhibits all the passages which are common to the four gospels; the second, third, and fourth contain three columns, and show the passages which are found in any three of the gospels; the fifth, sixth, seventh, eighth, and ninth are in two columns, and show the passages which occur in any two of the gospels; and the tenth contains the passages which are found only in one of the gospel narratives. The convenience and utility of such a scheme are at once apparent, and it has led in later times to the numerous and useful compilations, Roman Catholic as well as Protestant, known under the name of Synopses of the Gospels, the best and most popular of which are enumerated by Tischendorf in the introduction to his own *Synopses Evangelicæ*, p. 9, and foll.

HARMONY OF THE **SPHERES.** Many of the ancients supposed the motions of the stars and planets to produce a kind of music, which they called the harmony of the spheres. They attributed this music to the various proportionate impressions of the heavenly bodies on one another acting at proper intervals. Kepler wrote a work on the harmonies of the world, and particularly of the celestial bodies.

HARMS, CLAUS, a distinguished German divine, was b. May 25, 1778, at Fahrstedt, in South Ditmarsch. In 1797 he went to the gymnasium at Meldorf, and in 1799 to the university of Kiel. The rationalism of the time, in which he had been to some extent

educated, failed to give him satisfaction; and Schleiermacher's *Reden über die Religion* at last settled his faith. After supporting himself as family tutor from 1802 till 1806, he was appointed dean of Lunden, in Northern Ditmarsch, whence he was called, in 1816, to Kiel, as archdeacon and afternoon-preacher in the Nicolai-kirche. Next year, shortly before the tricentenary of the reformation in Germany, he issued, in defense of Protestant orthodoxy, 95 theses under the title, *Das sind die 95 Theses oder Streitsätze Dr. Luther's.* These produced a deep impression throughout Germany, and brought him a call to be bishop of the consistory about to be instituted for the Protestant church of Russia. This, as well as a call in 1834 to succeed Schleiermacher in Trinity church, Berlin, Harms refused. In 1835 he was made chief pastor and provost in Kiel, but was compelled to resign, in consequence of an attack of almost total blindness. The rest of his life was spent in retirement, devoted to literary activity. He died Feb. 1, 1855. Harms's published works are chiefly sermons, which may be reckoned among the best specimens of modern pulpit eloquence in Germany. Of these, the most famous are his *Winterpostille* (1808, 6te Aufl. 1846) and *Sommerpostille* (1815, 6te Aufl. 1846), to which a new series was added—*Neue Winterpostille* (1826) and *Neue Sommerpostille* (1827).—On Harms's life may be consulted Dorner's *Blätter der Erinnerung an das Jubiläum von Harms* (1842), and *Harms's Lebensbeschreibung verfasst von ihm selbst* (1851).

HARMS, Ludwig, 1809–66; b. at Hermansburg, Prussia. He was educated at Göttingen, and became assistant to his father, who was pastor in his native town. He brought the parish speedily into a revived condition, and built a missionary college, not directly soliciting money, but depending upon answers to prayer for all his needs. He gathered a class of students, built a ship, and sent her on a missionary voyage Oct. 18, 1853. In 1854 he established a printing press and a journal of missionary intelligence, which soon attained a circulation of 14,000 copies. He established an annual missionary festival, held in June in the open air, and attended by thousands, including strangers from all parts of Europe. He preached in a church edifice nearly 1000 years old, preserved partly because of its antiquity, but crowded to its utmost limits during two Sunday services, each of nearly four hours. He held also a third Sunday service, in the low German tongue, in his parsonage at night. While continually writing for his missionary journal, he published many books and kept up an enormous correspondence with his missionaries. With many eccentricities of personal conduct, he carried on a work of unparalleled activity with a most devout self-consecration, preaching sitting when at length too weak to stand. His parishioners loved him with a personal affection that was unanimous and without bounds.

HARNETT, a co. in central North Carolina, intersected by Cape Fear, South, and Little rivers, and the Western North Carolina railroad; 550 sq.m.; pop. '70, 8,895—3,038 colored. The surface is hilly, and much is covered with forests. Corn, cotton, and pork are the chief products. Co. seat, Lillington.

HARNETT, Cornelius, 1723–1781; b. England; in early life settled in North Carolina. He was a member of the colonial assembly, and one of the prominent leaders in legislation. When the revolution began he was among the most zealous and active friends of independence of the colonies. He was a member of the provincial congress, and on the committee to draft a state constitution, and when in the continental congress he was one of the signers of the articles of confederation. He was a prisoner to the British at the time of his death.

HA'RO, a small t. of Spain, in the province of Logroño, and 26 m. w.n.w. of the town of that name, is prettily situated in a fertile plain on the right bank of the Ebro. It has manufactures of hats, leather, brandy, and liquors. Much wine is grown in the neighborhood. Pop. 6,000.

HARO, Alonzo Muñez de, s.t.d., 1729–1800; b. Spain; studied in the university of Bologna, where he became rector, and professor of sacred literature. In 1770 he was sent out as archbishop of Mexico, where he was famous for his eloquence. He made some valuable presents to St. Peter's church in New York, and it is said that he founded a Roman Catholic free school in that city.

HAROERIS, the elder Horus, son of *Seb*, the Egyptian Saturn, and *Nu*, or Rhea, said to have been born on the second day of the epact. He was the brother, and not the son, of Osiris, from whom he is to be distinguished. In the inscriptions, he is said to be the son of Atum, of Ptah or Vulcan, and Athor or Venus, according to different legends. He was also lord of the south and Nubia, and particularly ruler over the heaven, illuminating the world with the brightness of his eyes. As such, he was identified with the sun and Apollo, and represented as hawk-headed, wearing the crown of the upper and lower world. His name is also found in the Greek dedications to him of the temples of Ombos and Apollinopolis Parva. His connection with the sun is, however, undoubted, as he is made on one inscription a child of the sun, and type of Mentu Ra or Mars. The festival of his eyes, which mythically represented the sun and moon, took place on the 30th Epiphi.—Birch, *Gallery of Antiquities*, i. p. 36; Wilkinson, *Manners and Customs*, iv. p. 395.

HAROLD I. (1035–1040), (surnamed Harefoot, probably on account of his swiftness in running), was the younger of Canute's two sons, by his first wife Alfgiva. According

to agreement on Canute's second marriage, his son by Emma was to inherit the English as well as the Danish throne: this son, Hardicanute, was, however, in Denmark at the time of his father's death, and being very unpopular with the Danish part of the population in England, lost half of his kingdom. Leofric, earl of Mercia, led the cause of Harold, while the powerful earl Godwin espoused that of Hardicanute. Civil war was happily averted by a compromise, and the kingdom was divided. Harold took London, with all the provinces n. of the Thames; while the possession of the south was given up to Emma for Hardicanute, who fixed her residence at Winchester, and established her authority over her son's share of the partition. In 1037 the thanes and people of Wessex submitted to Harold, and he was crowned king of all England, though it is stated that the archbishop of Canterbury, Egelnoth, at first refused to perform the ceremony himself, or to allow any of his brother-bishops to do so. He died at Oxford, Mar. 17, 1040.

HAROLD II. was the second son of the powerful Godwin, earl of Kent, and was b. at the close of the 10th century. On the death of Edward the confessor, the witenagemôte (q.v.), in the exercise of its rights, set aside the claims of Edgar Atheling, and, ignoring the reputed bequest of the late sovereign in favor of the duke of Normandy, elected Harold to fill the vacant throne. Duke William immediately asserted his claim, which was supported by Harold's brother Tostig and Harold Hardrade, king of Norway, for the sake of obtaining the duke's assistance to reinstate the former in the government of Northumbria. Tostig and the king landed on the coast of Yorkshire, and after defeating Morcar and Edwin, earls of Northumbria and Mercia, advanced to York, but were met by Harold at Stamfordbridge, and totally routed. Three weeks afterwards, William landed in England; the contending armies met at Senlac, about 9 m. from Hastings, where Harold's death (Oct. 14, 1066) made the duke of Normandy undisputed ruler of England.

HAROLD, King of Norway. See HAROLD, *ante.*

HAROLD'S-CROSS, a village-suburb of Dublin, situated on the Grand canal, 3 m. south-by-west from the center of the city, and now included in Rathmines and Rathgar township. It is built nearly in the form of a square, within which lies a spacious green, anciently the scene of periodical village festivals. It is the seat of a cotton-factory; and although the village is poor, there are many handsome villas in the vicinity, as also the handsome cemetery of Mount Jerome. Harold's-Cross also contains two convents of nuns, to which are attached free schools for the female children of the village.

HAROUN AL-RASHID. See HARÛN, *ante.*

HARP, a musical stringed instrument, much esteemed by the ancients. In Egypt, the figure of the harp is found delineated from the earliest ages in many different forms, some of them very simple, and others with great taste and ornament; some played on while standing, others while kneeling. The Celtic bards held the harp in the greatest honor. In the Highlands of Scotland the instrument has disapppeared, but it is still in use in Wales, and to some extent it lingers in Ireland, where, from its former prevalence, it is adopted as a national symbol. The old Franks and Germans punished those severely who injured a harpist in the hand. The harp was used as an accompaniment to the psalms sung by the early congregations of Christians. There are three kinds of harps now known—the ordinary Italian harp, which is strung with two rows of wire-strings, separated by a double sounding-board; this kind is now little used, being very imperfect. The double harp, or, as it is also called, David's harp, is a more useful instrument, and in the form of a triangle, with a sounding-board and gut-strings; it is always tuned in the principal key of the music, while the strings are altered to suit any modulations out of the key, by pressure of the thumb, or turning the tuning-pins of certain notes. These defects led gradually to the invention of the pedal harp, which has seven pedals, by which each note of the diatonic scale, in all the different octaves, can be made a semitone higher. The compass of the pedal harp is from contra F to D of the sixth octave above. In order to have the B flat, it must be tuned in the key of E flat. The music for the harp is written in the bass and treble clef, the same as pianoforte music. A celebrated harpist, Hochbrucker, in Donauwörth, invented the pedals in 1720; others say they were invented by J. Paul Velter, in Nuremberg, in 1730, who at least added the piano and forte pedal. After numerous attempts at further improvements, the harp at length reached a degree of perfection by the invention of the double-action pedal harp by Erard in Paris, which scarcely leaves anything more to be desired. By means of Erard's invention, each string can be sharpened twice, each time a semitone; so that the C string may be C flat, its full length, C natural by the first movement of the pedal, and C sharp by the next movement. The double-action harp is tuned with all the pedals half-down, and in the key of C natural.

HARPALUS, one of the youthful associates and cousin of Alexander the great. Phlip banished him 337 B.C. for endeavoring to secure the marriage of Alexander; but the latter recalled him and made him chief of the treasury in the expedition to Asia. He became a defaulter, but was pardoned; was satrap of Babylon, and, on account of his dissipated conduct, was imprisoned at Athens, whence he escaped and fled to Crete, where it is supposed he was murdered.

HARPE, JEAN FRANÇOIS DE LA, was b. at Paris, Nov. 20, 1739, studied at the collége d'Harcourt, and led for some time a rather checkered life. In 1762 he published a volume of juvenile poems, and in the following year his tragedy of *Warwick* appeared: it was very successful on the stage, and placed to his account both fame and money. Excepting the *Lycée*, this is by far the best of his works, though the writing has but little force. Grimm has admirably characterized the play as "*le coup d'essais d'un jeune homme de soixante ans.*" La Harpe's three subsequent plays, written in the same vein, *Timoléon*, *Pharamond*, and *Gustave Wasa*, entirely failed. The work that preserves his name, and has given him a permanent position among the literati of France, is his *Lycée ou Cours de Littérature*, which, in default of a better, has till lately been their only reliable work of *haute critique*. That portion which relates to ancient literature is of little value, and that in which the author treats of contemporary writers is entirely worthless, owing to the bitterness and pride of the critic, who could see nothing great or good in the works of a rival or fellow-laborer. The intervening portion is, however, of great value to the student, giving, for the time, a complete critical history of French literature. The book will also be found serviceable to the student of the language. At its commencement, the revolution found no more ardent admirer than la Harpe; but when he was cast into prison—where he is said to have been converted to Christianity by a fellow-captive, the bishop of St. Brieux—for refusing to countenance the extremes to which democracy was leading, his views entirely changed, and he became a firm supporter of church and crown. La Harpe died Feb. 11, 1803.

HARPER, a co. in s. Kansas, bordering on the Indian territory; 1000 sq.m.; pop. about 1500. The surface is level, and there is not much timber. Co. seat, Harper.

HARPER, ROBERT GOODLOE, LL.D., 1765–1825; b. Va. At the age of 15 he was a trooper in Greene's campaign. Soon afterwards he entered the college of New Jersey, and graduated in 1785. He was in the state legislature, and from 1794 to 1801 in congress, where he was among the leaders of the federalists. Harper was for several years eminent among Baltimore lawyers, and made a remarkable defense of judge Samuel Chase, who had been impeached on partisan grounds at the instance of John Randolph. He was elected to the U. S. senate in 1815. A few years later he traveled in Europe. He published a number of essays and addresses, chiefly on political topics.

HARPER & BROTHERS, the name of the largest publishing house in America. From 1825–69 the firm consisted of four brothers; James Harper, 1795–1869, died from injuries received by being thrown from his carriage; was elected mayor of New York city in 1844. John Harper, 1797–1875; Joseph Wesley Harper, 1801–70; Fletcher Harper, 1806–77. The firm now consists of five sons and one grandson of the original members. In 1817 the two elder brothers, after having completed their apprenticeship, commenced business as printers and publishers in New York under the name of J. & J. Harper. The two younger brothers entered their employ, and in 1833 the firm-name was changed to Harper & Brothers. Their establishment became too small for their increasing business, and in 1850 they erected a large and commodious structure on Franklin square, in Pearl street. They had scarcely moved into this when the fire of Dec. 10, 1853, occurred, destroying the entire building, and involving a loss of fully a million dollars. They at once set about erecting a handsome fire-proof structure, on a larger scale, upon the same site. Besides a large catalogue of valuable books, they publish *Harper's Magazine*, *Harper's Weekly*, *Harper's Bazar*, and *Harper's Young People*.

HARPER'S FERRY, a t. in Virginia, U. S., at the confluence of the Shenandoah with the Potomac, where the latter passes through the Blue Ridge of the Alleghanies, 53 m. n.w. from Washington. Its fine scenery has been celebrated by Jefferson in his *Notes on Virginia*. The Baltimore and Ohio railway here crosses the Potomac. It is the site of a government foundry, armory, and arsenal, which were destroyed and abandoned by the U. S. troops at the beginning of the civil war; and has since witnessed various struggles. It was also the scene of John Brown's abolition raid in Virginia, 1859. Pop. 2,500.

HARPER'S FERRY (*ante*), formerly occupied by the U. S. government, as an arsenal and depot of military stores, was the scene of the attempt of John Brown to start a revolution in the southern states (see BROWN, JOHN), and in the rebellion was among the first places to experience armed collision. In April, 1861, the confederates drove out the handful of union soldiers left to guard the arsenal; but in June the confederates retired, after destroying the bridge, the armory, and the arsenal. In 1862 the confederates again took possession, capturing nearly 12,000 prisoners. After the battle of Antietam the union forces regained the place and held it throughout the war. The pop. is now about 2,500. Harper's Ferry is the seat of Storer college.

HARPOCRATES, the name given by Greek writers to the younger Horus, the hieroglyphical inscriptions calling him *Har pa khrut*, "Horus the child," the son of Isis. See HORUS. According to the legend, he was a younger son of Osiris and Isis, who, having placed an amulet round her neck, gave birth to him at the winter solstice. He is described by Plutarch as lame in the lower limbs when born, to indicate the weak and tender shootings of corn. He is represented as a child wearing the skull-cap or *pschent*, the crown of the upper and lower world, and holding in his hands the whip

and crook, to expel evil influences. At the right side of his head his hair is gathered into a single lock, and his finger is placed on his mouth, an action indicative of youth, and mistaken by the Greek and Roman writers for that of silence, of which they made Harpocrates the divinity. Sometimes he wears an amulet in shape of a vase round his neck. The temple at Edfou or Apollinopolis Magna was dedicated to him, and in the sculptures he symbolizes the sun in the earliest hours of the day. He has generally been considered to be the winter sun, but rather represents the feeble and nascent sun of the later mythology. Lions were placed under his throne; cynocephali are said to be dedicated to him, probably from confounding him with the lunar god Khons; and the lotus, on which he is often depicted sitting, and which was thought to be open at sunrise and close at sunset, was particularly sacred to him. So was the Persea, or *Cassia Fistularis*. His worship was introduced as part of the Isiac cult into Rome, and he was supposed to be very efficacious in giving dreams; an edict of the people being, however, directed against it in the consulship of Gabinius. In the consulship of Piso and Gabinius his worship was driven from the capitol; but he was very popular in the days of Pliny. Although the name of Harpocrates is not mentioned earlier than Eratosthenes, yet as he mentions it as part of that of an ancient monarch, it was undoubtedly of high antiquity.

Birch, *Gallery of Antiquities*, i. p. 37; Wilkinson, sir G., *Mann. and Cust.*, iv. p. 405; Iablonski, *Pantheon*, i. p. 241.

HARPOCRATION, VALERIUS, a grammarian of Egypt, respecting whose personal history nothing is known. Some have considered him to be the Greek instructor of the emperor L. Verus, mentioned by Julius Capitolinus, while others have made him live so late as A.D. 360, because several passages are found in his works taken from Athenæus, who is supposed to have flourished about A.D. 300. Harpocration is the author of a very valuable lexicon on the ten orators, which contains a great deal of information on the law, history, antiquities, and general literature of Athens. The value of this work is much enhanced by the fact that all the authorities from which it has been compiled are lost. Harpocration is also the author of a work entitled *Collection of Flowery Extracts*.

HARPOON', the weapon with which whales and other large cetaceans are killed. See WHALE.

HARP SEAL, in commercial value the most important of the family of seals, frequenting the coasts of North America on the Atlantic, also Greenland, north Europe, and Asia. Great numbers are caught off Newfoundland. The skin is valuable, and the carcass yields excellent oil. It receives its name from peculiar marks on its back, resembling the shape of a harp.

HARP-SHELL, *Harpa*, a genus of gasteropodous mollusks of the whelk family (*buccinidæ*), having the last whorl of the shell very large, the shell ribbed longitudinally, the foot of the animal very large. The species, which are not very numerous, are found in the seas of warm climates, and particularly at the Mauritius. The shells are much prized for their great beauty, but must be kept in drawers, and not exposed to light, or their delicate and brilliant colors will fade.

HARP'SICHORD, a keyed musical instrument, formerly in extensive use, but now little known. In shape it was exactly like a grand pianoforte, to which its internal arrangements were also similar. The sound from the strings was produced by a small piece of crow-quill, or a piece of hard leather, which projected out of a slip of wood, called the jack, that stood upright between the strings, and was pushed upwards by the key, till the quill, or leather, twitched the string, causing a brilliant, but somewhat harsh sound, entirely deficient of any means of modification, in respect to loudness or softness. Specimens of the harpsichord, although now becoming more rare, are still to be found in good preservation, but rather as articles of vertu or curiosity, than as useful musical instruments. Many Italian and Dutch harpsichords were highly ornamented by the most eminent artists with valuable oil-paintings on the inside of the lid. The date of the invention of the harpsichord is uncertain. Before the 15th c., there is no trace of its existence. It was introduced into England early in the 17th century. In the 18th c., Kirkman, and later, Broadwood and Schudi, were the famous makers in London. After the invention of the pianoforte, the harpsichord and all instruments of the same kind, such as the spinet, were in time entirely superseded. See PIANOFORTE.

HARPSWELL, a t. in Cumberland co., Me., consisting of a peninsula and islands in Casco bay, 14 m. e. of Portland, pop. 1749. It is somewhat noted as a resort for pleasure-seekers.

HARPY, a fabulous creature in Greek mythology, considered as a minister of the vengeance of the gods. Various accounts are given of the the numbers, and parentage of the harpies. Homer mentions but one, Hesiod enumerates two—Aëllo and Okypete, daughters of Thaumas by the Oceanid Electra, fair-haired and winged maidens, very swift of flight. Three are sometimes recognized by later writers, who call them variously daughters of Poseidon or of Typhon, and describe them as hideous monsters with wings, of fierce and loathsome aspect, with their faces pale with hunger, living in an atmosphere of filth and stench, and contaminating everything that they approached.

The most celebrated tradition regarding the harpies is connected with the blind Phineus, whose meals they carried off as soon as they were spread for him; a plague from which he was delivered by the Argonauts, on his engaging to join in their quest. The Boreads Zetes and Calais attacked the harpies, but spared their lives on their promising to cease from molesting Phineus.—A harpy in heraldry is represented as a vulture, with the head and breast of a woman.

The name harpy has also been given in modern times to some of the *falconidæ*, as the marsh harrier (see HARRIER) of Europe, and the harpy or harpy eagle of South America (*harpyia destructor* or *thrasaëtus harpyia*), an inhabitant of the great tropical forests, where it preys chiefly on quadrupeds and to a large extent on sloths and young deer. Of all birds it has the most terrific beak and talons. It is larger than the common eagle; is short-winged and short-legged; the upper mandible greatly hooked; the feathers of the head capable of being erected into a great ruff and crest. It has not so elegant a form as the true eagles, but is probably equal to any of them in strength and courage. When adult, it is generally of a blackish slate color, with gray head, and white breast and belly. It makes its nest in trees.

HARQUEBUSS. See ARQUEBUSS.

HAR'RIER, a variety of dog used for hare-hunting, whence its name; probably of the same origin with the foxhound (q.v.)—from which it differs chiefly in its smaller size—or perhaps partly derived from the beagle. It does not exceed 18 in. in height at the shoulder, but otherwise greatly resembles the foxhound, even in colors. It is not so swift as the foxhound. Its scent, however, is extremely keen, which enables it to follow all the doublings of the hare.

Persons hunting with harriers are exempt from taking out a game license. See HARES.

HARRIER, *Circus*, a genus of *falconidæ*, allied to buzzards (q.v.), but differing from them in the more slender form of the body, longer and more slender legs, longer wings and tail, and in having the feathers around the eyes placed in a radiating manner, somewhat as in owls, a peculiarity which distinguishes them from all the other falconidæ. They are remarkable for their low flight, skimming along the ground in pursuit of small quadrupeds, reptiles, etc. The MARSH HARRIER (*C. æruginosus*), also called the MOOR BUZZARD, and sometimes the HARPY and the DUCK HAWK, is the largest British species, being about 21–23 in. long. The head of the adult male is yellowish white.—The HEN Harrier (*C. cyaneus*) is 18 or 20 in. long, the adult male of an almost uniform gray color, the female brown. The female is known as the RING-TAIL, from a rust-colored ring formed by the tips of the tail-feathers. The hen harrier derives its name from its frequent depredations in poultry-yards. The male of the hen harrier is called the *Blue Hawk* in Scotland.

HARRI-KARI (Happy Despatch), the term applied by the Chinese to official suicides in Japan. According to Dr. Macgowan, the Japanese estimate the number of these suicides at 500 per annum, exclusive of suicides by hanging or drowning. All military men, and persons holding civil offices under the government, are bound, when they have committed any offense, to rip themselves up, which they do by two gashes, in the form of a cross: but not until they have received an order from the court to that effect; for, if they were to anticipate this order, their heirs would run the risk of being deprived of their place and property. Not unfrequently, upon the death of superiors or masters, the same operation is self-inflicted by those who desire to exhibit devotion and attachment; sometimes also, in consequence of a disgrace or affront, it is resorted to, when no other resource presents.

HARRIMAN, WALTER, b. N. H., 1817; a teacher, Universalist minister, and political speaker. In the war of the rebellion he commanded a regiment of volunteers from New Hampshire. In 1867 he was chosen governor of that state, and afterwards was naval officer at Boston.

HARRINGTON, JAMES, an English political writer, was b. in Northamptonshire, of a good family, in 1611, studied at Oxford under the celebrated Chillingworth, and, at the termination of his university career, proceeded to visit the continent. His travels embraced the Netherlands, Germany, Denmark, France, and Italy. On the breaking out of the civil war, he took part with the parliament, and in 1646 was appointed by the parliamentary commissioners one of the personal attendants of the monarch. After the execution of Charles, he withdrew from public notice, and devoted himself to the elaboration and completion of his political system. The result was his famous *Oceana*, a kind of political romance, on the plan of Plato's *Atlantis*. The work was first published in 1656, and was dedicated to Cromwell, who read it, but was not overwell pleased with its strait-laced and somewhat finical republicanism, and its animadversions upon usurpation. "The gentleman must not think," the protector is reported to have said, "to cheat me of my power and authority; for what I have won by the sword, I will not suffer myself to be scribbled out of." Hume allows it to be "a work of genius and invention," and Dugald Stewart calls it "one of the boasts of English literature." Hallam's verdict is less favorable; he pronounces the author to be in general "prolix, dull, pedantic, yet seldom profound;" but he admits that he

"sometimes redeems himself by just observations." After the publication of *Oceana*, Harrington continued to exert himself in diffusing his republican opinions, founded a club called the "Rota," fell under suspicion after the restoration, and was imprisoned, but afterwards released. Meanwhile, however, an attack of insanity had supervened, from which he never perfectly recovered. He died at Westminster, Sept. 11, 1677. An edition of his writings was published by Toland in 1700, and a more complete one by Dr. Birch in 1737. The best edition is probably that by Hollis (with Toland's Life), in 1771.

HARRIOT, or HARIOT, THOMAS, 1560–1621; b. England; an astronomer and mathematician; tutor to sir Walter Raleigh, who, in 1585, appointed him geographer to the second expedition to Virginia. Harriot published an account of this expedition in 1588, and the work was afterwards reprinted in Hakluyt's *Voyages*. On his return to England, after an absence of two years, he resumed his mathematical studies with zeal and success; and having made the acquaintance of Henry Percy, earl of Northumberland, he received from him a yearly pension of £120. A manuscript of Harriot's entitled *Ephemeris Chrysometria* is preserved in Sion college; and his *Artis Analyticæ Praxis ad Æquationes Algebraicas resolvendas* was published at London in 1631. From some papers of Harriot's discovered in 1784, it would appear that he had either procured a telescope from Holland, or divined the construction of that instrument, and that he coincided in point of time with Galileo in discovering the spots on the sun's disk.

HARRIS, a co. in w. Georgia on the Alabama border and Chattahoochie river, crossed by the North and South Georgia railroad; 500 sq.m.; pop. '70, 13,284—7,493 colored. It has a hilly surface to a large extent covered with forests. Soil fertile; corn, potatoes, and pork are the chief products. Co. seat, Hamilton.

HARRIS, a co. in s.e. Texas, on Galveston bay, intersected by San Jacinto river and Buffalo bayou, and by four railroads; 1630 sq.m.; pop. '70, 17,375—6,509 colored. The surface is level and much of the soil is alluvial. Products: cotton, corn, and cattle. Co. seat, Houston.

HARRIS, CHAPIN A., 1806–60; b. N. Y.; organizer of the Baltimore dental college, which was the first institution of that character in the world. He published the *American Journal and Library of Dental Science, Dental Art, Principles and Practice of Dental Surgery*, and a *Dental Dictionary*.

HARRIS, or HERRIS, a district or parish of Scotland, in the Hebrides, comprises the southern portion of the island of Lewis and a number of adjacent islets. See LEWIS.

HARRIS, HOWELL, 1714–73; b. Wales; an open-air preacher and revivalist, the principal founder of Calvinistic Methodism in Wales. He was endowed with oratorical powers of the highest order, and his energy and enthusiasm carried his audiences by storm. He founded no fewer than 300 societies, was a friend of Wesley and Whitefield, and, when the French invasion of England was anticipated, raised a regiment at his own expense, and accompanied it on its march, preaching and expounding the Scriptures at every halting place.

HARRIS, JAMES, an English philologist and logician, the eldest son of James Harris, esq., of Close, Salisbury, was born July 20, 1709. His mother was the lady Elizabeth Ashley Cooper, sister of lord Shaftesbury, author of the *Characteristics*. He was educated at Salisbury, and Wadham college, Oxford, and entered upon the study of the law; but his father having died in 1734, leaving him a handsome fortune, he abandoned the pursuit of his profession, and gave his whole time, for a period of 14 years, to the study of his favorite Greek and Latin authors. In 1745 he married a daughter of John Clarke, esq., of Sandford, near Bridgewater, by whom he had five children, the eldest of whom, his only son, became the first earl of Malmesbury. In 1761 he was returned to parliament for Christchurch, which seat he retained until his death. In 1762 he was appointed a lord of the admiralty, and the next year, lord of the treasury, and in 1774, secretary and comptroller to the queen. He died in 1780. He is chiefly known as the author of *Hermes*, or a *Philosophical Inquiry concerning Language and Universal Grammar*, a work of great erudition, published in 1751. "It is written," says Coleridge, "with the precision of Aristotle and the elegance of Quintilian." He had previously published three treatises—*On Art; On Music, Painting, and Poetry;* and *On Happiness*. In 1775 appeared his essay *On Philosophical Arrangements*, part of a large projected work on the Logical System of Aristotle. His last work, entitled *Philological Inquiries* (1780), consists of a series of criticisms and comments on the principal ancient, mediæval, and modern authors. His works, with life by his son, the earl of Malmesbury, were published at London in 1801.

HARRIS, JOHN, 1802–56; an English theologian who at the age of 15 began to preach as a member of the Bristol itinerant society. After studying at the Independent college at Hoxton, he was in 1827 ordained pastor of a small congregation at Epsom. There in 1836 he wrote his essay *Mammon, or Covetousness, the Sin of the Christian Church*, which won a prize of 100 guineas offered by Dr. Conquest, and brought its author into notice, 30,000 copies being sold within a few years. In 1838 he received the degree of doctor of divinity from Brown university (R. I.), and was appointed president and professor of theology in Chestnut college; and in 1850, when the Independent colleges at

Highbury, Homerton, and Coward (near London) were united, Dr. Harris was elected principal of the new college thus formed.

HARRIS, SAMUEL, called the "apostle of Virginia," b. Va., 1724. He was a colonel of militia and held several public offices, but about 1758 was baptized and became an active preacher in the Baptist churches, his zeal and the force and plainness of his language bringing upon him persecution and physical abuse. In 1769 he was regularly ordained to the Baptist ministry. He was strongly opposed by the established church of Virginia, but abounded in charity, giving away a large part of his private means. In 1774 the general association of Separate Baptists elected him "apostle," and formally ordained him to that office.

HARRIS, SAMUEL, D.D., LL.D., b. Me. 1814; graduated at Bowdoin and in theology at Andover; teacher at Limerick and East Machias, Me. In 1841 pastor of a Congregational church in Conway, Mass., and in 1851 of the South Congregational church in Pittsfield. In 1855 he was chosen professor of systematic theology in the theological seminary at Bangor, Me., and in 1871 took the same position in Yale. Among his publications are *Zaccheus, or the Scripture Plan of Benevolence; Christ's Prayer for His Redeemed; The Kingdom of Christ on Earth;* etc.

HARRIS, THADDEUS WILLIAM, 1795-1856; b. Mass.; graduated at Harvard, and became a practicing physician. In 1831 he was chosen librarian of Harvard university. He devoted much attention to botany and natural history, and to promote the study of the latter science he organized a natural history society for the students of the college. In 1837 he was one of the state commission to make a botanical and zoological survey of Massachusetts, his most important works being a *Systematic Catalogue of the Insects of Massachusetts*, and his *Report on Insects Injurious to Vegetation.*

HARRIS, THOMAS LAKE, a spiritualist and social reformer, was b. at Fenny Stratford, Eng., May 15, 1823. In 1827 his parents brought him with them to the United States and settled at Utica, N. Y. He was yet very young when his mother died, and his father failed in business, thus throwing him upon his own efforts for education and support. He began to write for the press at an early age. At 21 he renounced the Calvinistic for the Universalist faith, and became a preacher of the latter. His health failing soon after his settlement over a church at Meriden, N. Y., he went to Charleston, S. C., whence he returned a year later to New York to become a pastor of the Fourth Universalist church, but ill health compelled him soon to resign. Sometime afterwards he organized in New York an "Independent Christian society," to which he ministered until the advent of "spiritualism" in 1849-50. He soon became a believer and supporter of the new faith. Two or three volumes of poetry from his pen were attributed to spiritual inspiration. He joined a community at Mountain Cove, Va., where it was proposed to apply the principles and laws of spiritualism to social relations and business affairs of the members, but in 1855 he returned to his ministry in New York, and founded a periodical for the exposition of his views. He became a dissenter from some of the doctrines of spiritualism as commonly understood. In 1857 he was, as he believed, subjected to sore temptations from evil spirits, whom he saw and with whom he conversed. He believed he won a victory over these spirits and attained the power, without losing external consciousness, of holding converse with the dwellers in the heavenly spheres. In 1858 he visited England and Scotland, and preached and lectured in London, Manchester, Edinburgh, and Glasgow. In 1861 he retired with a few friends to Amenia, Dutchess co., N. Y., and organized a community which grew into the "brotherhood of the new life," and in 1867 was removed to Portland, Chautauqua co., N. Y., where Mr. Harris purchased for himself a tract of 1000 acres of land, and adjoining farms of the same extent for his associates. Among those who joined him were lady Oliphant and her son Mr. Laurence Oliphant, M.P., from England. Owners of real estate cultivate it on their own account, community of property not being acknowledged. The "brotherhood" has no written creed or form of government. It is said to number more than 2000 people, mostly in Great Britain and on the continent, in India, and Japan, and to be held together by fraternal love and guided by an inspiration "from the Divine Spirit through the heavens," in fulfillment of a promise made "by the angel" to Swedenborg. They hold that man can be purified from sin and delivered from the power of evil spirits only through self-renunciation and a life of unselfish devotion to humanity, and that the church of the future will not be an ecclesiasticism, but a free society of people bound to each other by ties of fraternity and a common love of the Divine Being. They believe that God is two-in-one by the blending in him of the maternal with the paternal character, and that those who become angels will find their counterparts of sex and be joined together for all eternity. Marriage, therefore, is by them held to be peculiarly sacred and divine. Mr. Harris's prose works are: *Wisdom of Angels; Arcana of Christianity; Truth and Life in Jesus; Modern Spiritualism—its Truth and Errors; Sermons and Lectures; Millennial Age;* and *Breath of God with Man.* His poetical works are: *Starry Heavens; Lyric of the Morning Land; Lyric of the Golden Age; Regina; Hymns of Spiritual Devotion;* and *The Great Republic.*

HARRIS, TOWNSEND, 1803-78, an American diplomatist, b. at Sandy Hill, Washington co., N. Y. At the age of 14 he came to New York city and engaged in mercantile

life, but was actively identified with the cause of popular education. While president of the board of education, an office twice held by him, he succeeded in spite of long and pitiless opposition, in getting the free academy (now college of the city of New York) established. In 1848 he projected and carried out a voyage of exploration and commerce in the South Pacific, gaining vast information which he turned to the benefit of the country. He was U. S. consul at Ningpo, China, 1854. In 1855 he was considered by the patriotic men of all parties the best equipped man to follow up the work of com. M. C. Perry in Japan. On his voyage outward he negotiated a treaty with Siam, and from 1856 to 1861 was consul-general of the United States in Japan, residing at Shimoda; and in Yeddo where he negotiated a treaty of trade and residence for Americans in Japan. Perry opened Japan to ships and their crews only. Harris inaugurated the policy of friendship, commerce, and residence, which twenty nations now enjoy with Japan. He was one of the founders of the New York "society for the prevention of cruelty to animals." A biography of Harris is in preparation.

HARRIS, WILLIAM, S.T.D., 1765–1829; b. Mass.; graduated at Harvard and licensed as a congregational preacher, but became minister of an Episcopal church in Marblehead; subsequently rector of St. Mark's church, New York, and the founder of a school for classical studies. In 1811 he was elected president of Columbia college and held the office 18 years.

HARRIS, WILLIAM TORREY, LL.D., b. Conn. 1835; studied at Yale college; emigrated to the west and became a teacher in St. Louis, and soon afterwards superintendent of public schools. He was one of the founders of the St. Louis philosophical society, and in 1857 he started the *Journal of Speculative Philosophy*. In 1874 he was president of the national association of teachers. He is one of the recognized leaders in metaphysical investigation on this side the Atlantic. He is an earnest advocate and expounder of Hegel's philosophic system.

HARRISBURG, the capital of Pennsylvania, U. S., is situated in the midst of magnificent scenery on the left bank of the Susquehanna river, 107 m. w.n.w. of Philadelphia, lat. 40° 16′ n., long. 76° 50′ west. It has a handsome state-house, a court-house, jail, state arsenal, state lunatic asylum, numerous churches, several academies, eight or ten newspaper-offices, a railway bridge, 2,876 ft. in length, and seven diverging railways. It was settled in 1733 by John Harris, an Englishman, under a grant from the Penns, the original European settlers of Pennsylvania. Pop. '70, 23,104.

HARRISBURG (*ante*), the capital of Pennsylvania, in Dauphin co. on the Susquehanna river, and the Cumberland Valley, the Northern Central, the Pennsylvania, and the Philadelphia and Reading railroads; 106 m. by rail w. of Philadelphia; pop. '70, 23,104; in '80, 30,412. The Susquehanna is here over a mile wide, and there is a small island near the middle of the stream. There are three railroad bridges crossing the river. The city is handsomely situated in the midst of a picturesque and fruittul region. One of the most conspicuous edifices is the state-house, a fine brick structure 180 by 80 ft., with a circular Ionic portico over which is a dome, from which a splendid view is to be had. The capitol was first occupied in 1822. Among the other public buildings are the court-house, the state lunatic asylum, the prison, several market-houses, and some fine churches and school-houses. Harris park is a handsome public square. Among the chief manufacturing establishments iron foundries hold a leading place; there are also machine-shops, nail factories, car, coach, and steam-engine factories; cotton, knitting, planing, and saw mills, tanneries, breweries, etc. There is a regular city government consisting of a mayor and common council. The city is finely paved, and is supplied with gas and water. There are about 35 churches embracing more than a dozen denominations. The city is the seat of a Roman Catholic archbishop. The earliest settlement was in 1726 by John Harris, an Englishman, who engaged in trade with the Indians. In 1785 a town was laid out for the seat of justice of the county of Dauphin (named after the French dauphin). The town was named Louisburg, after Louis XVI., but six years later it was incorporated under its present name; in 1812 it was selected as the state capital, and in 1860 incorporated as a city.

HARRISON, a co. in s. Indiana on the Ohio river, intersected by Indiana creek, and the Missouri, Iowa and Nebraska railroad; 500 sq.m.; pop. '70, 19,913. It has a hilly and picturesque surface. Chief productions: corn, wheat, oats, and pork. Co. seat, Corydon.

HARRISON, a co. in w. Iowa on the Nebraska border, intersected by the Chicago and Northwestern, and the Sioux City and Pacific railroads; bounded on the w. by the Missouri; 700 sq.m.; pop. '80, 16,649. The surface is mostly level, and the soil fertile, producing corn, wheat, oats, etc. Co. seat, Logan.

HARRISON, a co. in n.e. Kentucky, intersected by Licking river, and the Kentucky Central railroad; 370 sq.m.; pop. '70, 12,993—2,378 colored. It has a hilly and undulating surface, and fertile soil. The main productions are corn, wheat, oats, and pork. Co. seat, Cynthiana.

HARRISON, a co. in s. Mississippi on the gulf of Mexico, drained by Wolf and Biloxi rivers, and reached by the Mobile, New Orleans and Texas railroad; 900 sq.m.;

pop. '70, 5,795—1427 colored. It has a prairie surface, with considerable timber. Co. seat, Mississippi City.

HARRISON, a co. in n. Missouri on the Iowa border, intersected by Crooked Fork of Grand river; 760 sq.m.; pop. '70, 20,318—73 colored. Surface prairie and timberland; main productions: corn, oats, wheat, pork, and cattle. Co. seat, Bethany.

HARRISON, a co. in e. Ohio drained by affluents of Tuscarawas river, and intersected by the Pittsburg, Cincinnati and St. Louis railroad; 400 sq.m.; pop. '70, 18,682. The surface is somewhat hilly, and the soil very fertile. Chief productions: corn, oats, wheat, butter, and wool. There are mines of bituminous coal. Co. seat, Cadiz.

HARRISON, a co. in s.e. Texas on the Louisiana border between Caddo lake and Sabine river, intersected by the Texas and Pacific railroad; 970 sq.m.; pop. '70, 13,241—8,931 colored. Surface uneven and much of it covered with forests. The soil is fertile, producing cotton, corn, etc. Co. seat, Marshall.

HARRISON, a co. in n. West Virginia on the w. fork of Monongahela river, traversed by the Baltimore and Ohio railroad; 445 sq.m.; pop. '70, 16,714—655 colored. The surface is hilly or mountainous with fertile valleys. Productions: corn, wheat, lumber, and pork. Co. seat, Clarksburg.

HARRISON, BENJAMIN, 1740–91; b. Va. He studied at William and Mary college, and in 1764, and 1777–82 was speaker of the colonial house of burgesses. He was an opponent of the stamp act, a delegate to the first continental congress, and one of the signers of the declaration of independence. In 1782 he was chosen governor of his state, and was twice re-elected. He was a member of the committee that adopted the federal constitution, but himself voted against it. He was the father of William Henry Harrison, ninth president of the United States.

HARRISON, JOHN, a celebrated mechanician, was b. at Faulby, near Pontefract, Yorkshire, in 1693. His mechanical genius, which early displayed itself, led him to study the construction of clocks and watches, with a view to diminishing as much as possible their errors and irregularities, and by 1726 he had effected considerable improvements in their structure. In 1714 the government had offered prizes of £10,000, £15,000, and £20,000 for the discovery of a method for determining the longitude within 60, 40, or 30 m. respectively. After repeated attempts, Harrison constructed a chronometer, which, in a voyage to Jamaica in 1761–62, was found to determine the longitude within 18 m.; he therefore claimed the reward of £20,000, which, after a delay caused by another voyage to Jamaica, and further trials, was awarded to him in 1765—£10,000 to be paid on Harrison's explaining the principle of construction of his chronometer, and £10,000 whenever it was ascertained that the instrument could be made by others. The success of Harrison's chronometer is owing to his application of the *compensation curb* to the balance wheel, and on the same principle he invented the *gridiron pendulum* for clocks. These, along with his other inventions, the *going fusee* and the *remontoir escapement*, were considered to be the most remarkable improvements in the manufacture of watches of the last century (see HOROLOGY). Harrison died in Red Lion square, London, in 1776.

HARRISON, JOHN, d. 1660; a col. in Cromwell's army, on whom devolved the duty of escorting Charles I. from Hurst castle to Windsor, in Dec., 1648, and from Windsor to London for trial. He was afterwards made a maj.gen., and became important in the councils of the protectorate. In religion he was a fanatic, and in 1653 was leader of the Anabaptists. On the restoration of Charles II. in 1660, Harrison was executed, in company with nine other regicides.

HARRISON, WILLIAM HENRY, ninth president of the United States, b. Feb. 9, 1773, in Virginia, was the son of Benjamin Harrison, who signed the declaration of independence. On the death of his father, he joined in 1792, as ensign, the army which Wayne was leading against the north-western Indians. He left the army in 1797. In 1801 he became governor of Indiana, and as its representative in congress, succeeded in passing a law relating to the sale of the federal land in small parcels, to which the western states ascribe all their prosperity. In the war against the Indians in 1811, and which soon became also a war against the English in Canada, Harrison, as commander-in-chief of the American army, showed great military talent. He defeated the Indians in an important battle at Tippecanoe, and by the victory of Perry on lake Erie, was enabled to pursue the British invaders into Canada, where, on Oct. 5, 1813, he totally routed them in the battle of Thames. In 1814 he resigned his commission. In 1816 he was elected to congress, and in 1824 became a member of senate. In 1828 he went as ambassador to Colombia, but was recalled in 1829, and for 12 years was clerk of a county court in Ohio. The whig party tried in vain to make him president of the United States in 1836, but succeeded in 1840. He died a month after his inauguration, in April, 1841.

HARRISONBURG, the seat of justice in Rockingham co., Va., on a branch of the Baltimore and Ohio railroad, in the Shenandoah valley, 2 m. n.e. of Staunton; pop. 3,600. In the place are eight churches, several schools, and a number of manufactories.

HARRODSBURG, the seat of justice of Mercer co., Ky., on a branch of the Cincinnati Southern railroad, and near Salt river, 32 m. s. of Frankfort; pop. '70, 2,205. It has mineral springs, and is a place of summer resort. Among its institutions is Daughters' college, under the care of the Christian denomination. There are flour mills, carriage factories, and distilleries. It is said to be the oldest town in the state, the settlement dating from 1774, when capt. James Harrod put up the first cabin in that neighborhood.

HARROGATE, HARROWGATE, or HIGH HARROGATE, a village in Yorkshire, 20 m. w. of York city, is celebrated for sulphureous and chalybeate springs. The sulphureous springs are also saline, and of laxative and diuretic quality, while the chalybeate waters are tonic. Harrogate is a very agreeable residence, the surrounding country being full of beauty and interest; it is largely frequented by visitors in summer, and is now easily accessible by the railway from Leeds to Doncaster. The waters are of considerable activity, and should only be taken under medical advice. They are used both externally and internally, and are in great repute in many diseases of the skin, and in some cases of dyspeptic disorders, scrofula, gout, etc. Harrogate springs were discovered in 1571. A local report on their virtues, with analyses in detail, by prof. Hoffman, was published in 1854. Pop. in '71, 6,843.

HARROW, an agricultural implement, used for smoothing and pulverizing plowed land, for covering the seeds previously sown. It consists of a frame of a square or rhombic form, in which are fixed rows of teeth, or *tines*, projecting downwards. The harrow is a very ancient implement, having been in use beyond the dawn of history; but as in early times only the lighter soils were cultivated, it often consisted of bushes, or branches of trees, which merely scratched the ground. Subsequently, we find a wooden frame and wooden tines in use; next, the wooden frame with iron tines, a form of the instrument very much used at the present day, and especially in favor for light soils. For heavy soils, the harrow constructed wholly of iron is most used, as it is heavier and does more execution; and of this sort the zigzag form made by Mr. Howard of Bedford is preferred. The Howard harrow has the tines so arranged that no one follows in the track of another, but each has a separate line of action, which greatly diminishes the risk of any portion of the surface escaping pulverization. A "brake" is a large harrow used for breaking down rough or hard land. The "chain-harrow," which is a congeries of iron rings, is useful for covering grass-seeds, and especially for separating weeds from the earth or clods in which they are enveloped.

HARROW-ON-THE-HILL, a village of Middlesex, England, is finely situated on the summit of a small eminence about 12 m. n.w. of London, on the London and Birmingham railway. Pop. '71, 4,997. The village derives its celebrity solely from the grammar-school founded here, in 1571, by John Lyon, a wealthy yeoman of the parish. The school was originally intended to afford a gratuitous education to poor boys belonging to the parish, and is still nominally free to all the boys of the parish, but, as in many other cases, it has been diverted from its primary purpose, and is now chiefly attended by the sons of the nobility and gentry, and possesses a very high reputation. It has several exhibitions to Oxford and Cambridge. Among the eminent men who have been educated at Harrow-on-the-hill, may be mentioned sir William Jones, Dr. Parr, lord Byron, George Canning, and sir Robert Peel.

HARRY, BLIND, a Scottish minstrel of the 15th century. Scarcely anything is known of his life beyond what is told by Dr. John Major (or Mair) in his *History of Scotland*, published in 1521. "When I was a child," he says, "Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a whole book of William Wallace, weaving the common stories (which I, for one, only partly believe) into vernacular poetry, in which he was skilled." In 1490–92, Blind Harry is found at the court of king James IV., receiving occasional gratuities of five, nine, and eighteen shillings. The poem attributed to him, *The Life of that Noble Champion of Scotland, Sir William Wallace, Knight*, was completed before the end of the year 1488, when it was copied by John Ramsay. This copy, the oldest MS. of the work now known to exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11,861 lines, of ten syllables each, is written in rhyming couplets. The language is frequently obscure, and sometimes unintelligible, but the work as a whole is written with vigor; in some passages, it kindles into poetry; and it is altogether a surprising performance, if we receive it as the composition of one who was born blind. The author seems to have been familiar with the metrical romances which were the popular literature of the time, and he makes repeated appeals to two Latin lives of Wallace, one by his schoolfellow, master John Blair, another by sir Thomas Gray, parson of Liberton. But the poem has no claim to be regarded as history; it is full of gross mistakes or misrepresentations of facts known to every one, and it can only be looked upon as an embodiment of the wild and sanguinary legends which two centuries had gathered round the name of the martyred hero of a fierce struggle for national life. The work is believed to have been printed in the Scottish capital as early as 1520, but no perfect copy is known to be preserved of any earlier edition than that of Edinburgh in 1570, bearing the title of *The Actis and Deidis of the Maist Illuster and Vailyeand Campioun Schir William Wallace, Knicht of Ellerslie.*

The work was reprinted at Edinburgh in 1594, 1601, 1620, 1648, 1673, and 1758; at Glasgow, in 1665 and 1699; at Aberdeen, in 1630; and at Perth in 1790. The best edition is that of Dr. Jamieson (from the MS. of 1488), published at Edinburgh in 1820, in 1 vol. 4to. The work was for about 200 years one of the most popular in Scotland, but gradually fell into neglect as its language, never very easy ceased to be understood except by scholars. Its place was supplied by a modernized version by William Hamilton of Gilbertfield, published at Glasgow in 1722, with the title of *A New Edition of the Life and Heroic Actions of the Renoun'd Sir William Wallace.* This is a poor performance, but it continued to be widely circulated among the Scottish people almost to our own day.

HART, the name given to the stag (q.v.) or male of the red deer, from the age of six years, when the crown or *surroyal* of the antler begins to appear. Great importance was formerly attached to the distinction of names proper to deer at different ages, and Guillim, in his heraldry, defines hart as above, rebutting the notion "that a stagge, of what age soever he be, shall not be called a hart until the king or queen have hunted him;" but "if the king or queen do chase or hunt him, and he escape away alive, then after such hunting or chasing he is called a *hart royall.*"

HART, a co. in n.e. Georgia on the border of South Carolina, bounded n. and e. by Savannah river; 380 sq.m.; pop. '80, 9,094—2,804 colored. The surface is uneven, and much of it is covered with forests. Corn and cotton are the chief productions. Co. seat, Hartwell.

HART, a co. in w. central Kentucky on Green river, intersected by the Louisville and Great Southern railroad; 420 sq.m.; pop. '70, 13,687—2,192 colored. The surface is hilly, and to a large extent covered with forests. The main products are cotton and corn. Co. seat, Hartwell.

HART, JAMES MCDOUGAL, b. Scotland 1828; came, when a child, to the United States, and became a coach-painter in Troy, N. Y. A love of art led him to attempt landscapes, and in 1851 he studied in Düsseldorf under Schermer. In 1856 he settled in New York, and the next year became an associate in the academy of design, and two years later an academician. "Autumn Woods in the Adirondacks," "Coming out of the Shade," and "On the March" are some of his more noted works. Mr. Hart, with his brother William, was among the first of that group of American artists who have made American landscape art eminent. He paints with vigor, and close adherence to nature; his work is full of sentiment, and is further marked by great breadth of handling in composition.

HART, JOEL T., b. Ky., 1810. When about 20 years of age he began to work for a stone-cutter, and at once exhibited a talent for modeling in clay, which attracted public attention, and he was employed to model busts of gen. Jackson and Cassius M. Clay. Of the latter he made a bust in marble, and this was so satisfactory that an association of ladies engaged him to produce the statue of Henry Clay, which is in Capitol square, Richmond, Va. There is a specimen of his work in bronze in New Orleans, in the shape of a colossal statue of the same statesman. Hart has resided many years in Florence, where he has made numerous statues, busts, etc. Among them "Angelina," "Il Penserosa," and "Woman Triumphant."

HART, JOHN, 1708–80; b. N. J.; a farmer, and several times a representative in the provincial legislature, and in 1776 was sent to the continental congress. He was, in 1777–78, a leading member of the committee of safety. During the English invasion his farm was desolated and he was hunted as a fugitive. After the battle of Trenton he returned to his home. He was one of the signers of the declaration of independence.

HART, JOHN SEELEY, LL.D., b. Mass., 1810; graduated at Princeton, taught at Natchez, Miss.; and in 1834 returned to the college of New Jersey as adjunct professor of ancient languages, where (1836–41) he was in charge of the Edgehill school. He was principal of the Philadelphia high school (1842–59), and of the New Jersey state normal school (1863–71); in 1872 became professor of rhetoric and the English language in the college of New Jersey. Among his publications are *Prose Writers of America; Manual of English Literature; Manual of American Literature,* etc.

HART, NANCY, a colored woman of Georgia, famous in the revolution for acts of valor in support of the cause of American freedom. Her chief exploit was in the case of five tories who came to her cabin intent on plunder and outrage. She killed one, seriously wounded another, and took the other three prisoners. Hart county bears her name, given in honor of her patriotic conduct.

HART, SOLOMON ALEXANDER, R.A., an English painter, of Jewish origin, was b. at Plymouth, in Devonshire, April, 1806, entered the Royal academy, London, in 1823, and exhibited his first oil-picture, "Instruction," in 1828. Since then, he has painted, among other works, "The Elevation of the Law" (1830); "Isaac of York in the Donjon of Front-de-Bœuf" (1830); "English Nobility privately receiving the Catholic Communion" (1831); "Eleanor sucking the Poison from Edward's Arm"; "Milton visiting Galileo in Prison" (1847); and "The Three Inventors of Printing" (1852). In 1835 Hart became an associate; in 1840 an R.A; in 1854 professor of painting in, and in 1865 libra-

rian of, the Royal academy. His picturesque vigor and technical power are universally acknowledged.

HART, WILLIAM, brother of JAMES MCDOUGAL HART; b. Scotland, 1823; came to Albany, N. Y., in 1831, and, like his brother, was employed in coach painting in Troy. Like his brother, also, he developed a taste for landscape painting, and in 1848 exhibited a specimen of his work in the National academy of design in New York. In 1850 he returned to his native country for study. On returning he settled in New York, and soon became an academician. For several years he was president of the Brooklyn academy of design. Some of his most notable works are "The Last Gleam," "The Golden Hour," "Opening in the Elands," "Up the Glen in the White Mountains," and "Sunset in Dark Harbor, New Brunswick." He was one of the founders, and for some years president of the water-color society, and is himself eminent in that branch of art. He is remarkable for luminous brilliancy of coloring, particularly in skies.

HARTE, FRANCIS BRET, b. N. Y., 1839; went to California when 25 years old and roved about, digging for gold, teaching school, and running express. In 1857 he appeared in the *Golden Era* as a type-setter, but soon began to write sketches for the paper which attracted immediate attention. He was advanced to assistant editor, and a little later became principal editor of the weekly *Californian*. He was for six years secretary of the mint in San Francisco, and during the time wrote a number of poems for the city journals, such as "The Society upon the Stanislaus," "The Pliocene Skull," and "John Burns of Gettysburg." In 1868 he was an editor of the *Overland Monthly*, in which he began more ambitious work with "The Luck of Roaring Camp," a characteristic picture of mining life. The next year he published "The Outcasts of Poker Flat," following with other tales of a similar kind. In 1870 appeared a short poem entitled "Plain Language from Truthful James," or "The Heathen Chinee," which had unexampled popularity. For a short time he was professor of recent literature in the university of California. In 1871 he removed to New York and collected and published his *Condensed Novels*. Among other of his publications are *Gabriel Conroy*, *East and West Poems*, *Mrs. Skagger's Husbands*, etc. He has been a frequent contributor to the *Atlantic Monthly*. In 1878 he was appointed U. S. consul to Crefeld, in Rhenish Prussia, and afterwards exchanged to Glasgow, Scotland.

HARTEBEEST. See KAAMA.

HARTFORD, a co. in n. Connecticut, on the Massachusetts border, intersected by Connecticut, Farmington, Scantic, and Hockanum rivers, and by six railroads; 770 sq.m.; pop. '70, 109,007; in '80, 125,377. It has a hilly surface, and the soil is generally very fertile; chief productions: tobacco, corn, oats, butter, and fruit. There are also a large number of important manufacturing establishments. Co. seat, Hartford city.

HART FORD, an important city of Connecticut, U. S., and capital of the state, is situated on the w. bank, and 50 m. from the mouth, of the Connecticut river, and distant 111 m. n.e. from New York. It has a handsome state-house, city hall, arsenal, deaf and dumb asylum, an admirable asylum for the insane, an Episcopal college, numerous churches, a free library, 12 newspapers, and many banks and insurance offices. It has a large trade and many flourishing manufactories, among which is the large establishment for the making of Colt's firearms. The various manufactures amount to over £1,000,000 per annum. Railways connect the city with all New England, and many lines of steamboats, packets, and sailing-vessels carry on extensive commerce. Tobacco and silk are among its exports, and its manufactures of cotton, books, carriages, clocks, machinery, etc., are distributed over the whole continent. Hartford is one of the oldest towns in New England, where were enacted the famous "blue laws." Pop. in '70, 37,180. It was also the seat of the Hartford convention (q.v.).

HARTFORD (*ante*) is on the New York, New Haven and Hartford railroad; pop. '80, 42,553. This "queen city of New England" is beautifully situated on small hills at the junction of the Park river with the Connecticut. The township extends about 5½ m. n. and s., and 3¾ e. and w., having an area of more than 16 sq.m.; the city area is about 10 sq. miles. Park river runs through about the middle, and is crossed by a dozen bridges. There is a fine bridge over the Connecticut, about 330 yards long, connecting with East Hartford. The city is regularly laid out, Main street being the great thoroughfare and chief seat of retail trade. In the outer portion and the suburbs of the city are many fine residences. The principal pleasure-ground is the Bushnell park, named after the late rev. Dr. Horace Bushnell, whose memory Hartford treasures as one of its peculiar honors. The park is one of the finest of its size in the country. It covers 45 acres, and is nearly encircled by Park river. In the w. part are the state capitol, a colossal bronze statue of Thomas Church Brownell, Episcopal bishop of Connecticut and the founder of Trinity college (Hartford); Ward's statue of gen. Israel Putnam, and a statue of Dr. Horace Wells, in honor of his discovery of the use of anæsthetics. In the heart of the city is Statehouse square, containing the original statehouse, a brick structure built in 1794. The famous Hartford convention met in the senate chambers in 1815. In the secretary's office is the original charter of the colony framed in wood, of the charter oak. There are in the senate chamber Stuart's portrait of Washington, and portraits of all the governors of the colony and state from 1667

down. The new state capitol occupies the former site of Trinity college. The building, completed in 1878 at a cost of $1,500,000, is of white marble, 300 by 200 ft., and 250 ft. to the top of the dome. Its fronts are broken by angles, columns, arches, galleries, and commemorative sculpture. Resting on the brow of a hill, it commands a splendid view, and is itself seen from all parts of the city. The hall of representatives is in the center of the s. front, and is lighted on three sides. The arcades are upheld by polished granite columns, and the tympani are filled with sculptures, the subjects of which were selected from Connecticut history. At the angles of the dome are statues representing 12 of the original states, and on the top is a statue of Connecticut holding her charter. The new site of Trinity college is on Rocky hill, approached by avenues leading through the most delightful part of the city. The buildings (yet unfinished) are of brownstone in early French Gothic style. They will form three great quadrangles, and are intended to be the best edifices for educational purposes in the country. The front will be 1300 ft. long. The grounds cover 80 acres. The high school is a noble building, of Norman architecture, costing $160,000. Near by, on Asylum street, is the residence of the late Lydia H. Sigourney, the poetess. A mile away on a hill lives Samuel L. Clemens, more generally known as "Mark Twain." Another conspicuous feature is Armsmear, the residence of the Colt family, the spacious grounds being adorned with groves, lakes, statuary, greenhouses, and a deer park. The deaf and dumb institute, founded by Dr. Gallaudet in 1817, is the oldest of its kind in America. The building is finely situated on a shady hill, and usually has from 200 to 250 inmates. The retreat for the insane is a stately sandstone building commanding a splendid view. More than 4,000 patients have been received here, and 2,000 have been cured. The city hospital, the state arsenal, and the widows' home are also noteworthy edifices. Besides these there are many conspicuous business edifices of great extent and value. The great manufactories are the Colt rifle and pistol factory (capital $1,000,000), the Washburn car-wheel factory, the Weed sewing machine factory, the Pratt and Whitney machine company, the Phœnix iron foundry, the Plimpton envelope company, the Batterson marble works, and the Cheney silk works. Among the great book makers are the American publishing company, and Case, Lockwood and Brainard. There are 37 churches, many of them very beautiful structures, particularly that of the Good Shepherd (Episcopal) built by Mrs. Colt as a memorial to her husband, of Gothic style with grand pictorial windows. In the old graveyard behind the Center Congregational church lie the remains of Thomas Hooker, "the renowned minister of Hartford, and pillar of Connecticut, the light of the western churches," with the ashes of a long line of distinguished citizens from the earliest settlement. The chief monument is a massive sandstone structure to the honor of the first settlers. There are 17 banks, 9 masonic lodges, 3 of odd-fellows, 3 knights of Pythias, 21 temperance societies, and 7 military companies. Of the latter, the Putnam phalanx of only 125 men are said to represent $11,000,000 of property. In proportion to the number of inhabitants, Hartford is supposed to be the richest city in America. The Cedar hill cemetery, on a bare and lofty elevation, has some fine monuments, including the Beach memorial, and testimonials to Colt, Russell, and others. Another institution worthy of note is the Wadsworth athenæum in which are many works of art by painters and sculptors. The Connecticut historical society has quarters in the athenæum, and has a remarkable collection of ancient documents illustrating New England history.

The city is divided into seven wards; the mayor is chosen for two years; the aldermen (two for each ward) are chosen one-half annually, and hold office two years; and the council of four for each ward are elected annually. There are police and fire departments, good water supply, and gas. Among the institutions not mentioned are the Hartford hospital, the orphan asylum, city mission, home mission, state Bible society, state missionary society, a number of private benevolent societies, a female seminary, and several select schools. There are 16 public schools, a grammar school (the oldest in the state), dating from 1655, and a school of design. Hartford has an interesting history. It was settled in 1635 by persons from Massachusetts, but originally from Braintree, England. The Dutch of New Amsterdam had possession for a time, but were ejected in 1654. The general court of the colony was established in 1636; the first church built in 1638; a war with the Pequot Indians occurred in 1637, and in 1639 a constitution for the government of the colony was framed. A house of correction was built in 1640, and four years later the first tavern was authorized. In 1650 a code of laws was drawn up which reduced the number of capital offenses from 160 under English law to 15. In 1687 gov. Andros attempted to seize the colonial charter, but it was carried off and hid in the famous charter oak. A printing establishment was started in 1764. Connecticut was early in the patriotic movement of the revolution, and Hartford was well represented at the taking of Ticonderoga. In 1784 the city was incorporated, and in 1875 it became the sole seat of the state government, an honor theretofore shared with New Haven.

HARTFORD CONVENTION, in the political history of the United States, was an assemblage of delegates from the New England states, at Hartford, Conn., Dec. 15, 1814. This convention was proposed by the Massachusetts legislature, which appointed delegates from that state. The government of the United States, under the

presidency of Mr. Madison, declared war against Great Britain in 1812, for injuries to commerce growing out of the war with France, and the impressment of American seamen by British men-of-war. Of the two American political parties, the democratic favored France, while the federalists took the part of England. As the war destroyed commerce and the fisheries, the chief interests of New England, which was also federalist in politics, there was a violent opposition. The governors of these states would not allow the militia to leave them, and complained that while their people were taken by conscriptions, their own coasts were left undefended. The ostensible object of the convention was to devise means of security and defense. George Cabot of Massachusetts was elected president, and Theodore Dwight of Connecticut, secretary. It sat 20 days with closed doors, and as it was supposed to be of a treasonable character, it was watched by a military officer of the government. The convention, at rising, proposed certain amendments to the constitution—free population as the basis of representation, a single term for the presidency, to exclude foreigners from office, to limit embargoes to 60 days, and to require a two-thirds vote of congress to admit new states, make war, etc. Though no treasonable act was committed, and no treasonable intention proved, the federalist party never recovered from the odium of its opposition to the government, and "Hartford Convention Federalist" has been to this day a term of reproach.

HARTFORD CONVENTION (*ante*). To the brief statement under this head may be added from the journal of the assembly (not published until 1833) some further facts, premising, however, that much of the odium thrown upon the convention was undeserved, and mainly the offspring of partisan malignity. The controlling idea of the body was the preservation of those state rights for which their opponents, the democrats, were then and have ever since been loudly clamoring. The men composing the convention were among the best and most intelligent citizens, but all were federalists. The war with England had destroyed the prosperity of the eastern states, yet they made no opposition to the war, as was untruly charged. In fact the war was over, for the peace of Ghent was agreed upon before the convention got fairly to work, though the fact was unknown, and the battle of New Orleans was fought nearly two weeks after the treaty was signed. The federalists, at whose head once stood George Washington, had greatly declined, and had no real strength in the nation. The complaints of the convention were: That the New England states were deprived of their militia while their sea-coast was left at the mercy of the English enemy; that some check ought to be put upon the almost arbitrary powers of the general goverment; but the acts of the three states calling the convention were to be "not repugnant to their obligations as members of the union." So said Massachusetts, and Connecticut and Rhode Island agreed. There is no ground for the charge that the convention was or intended to be disloyal. The main propositions are stated (see Hartford Convention, *ante*), and amount to this: That the people of a state ought not to be subject to draft or conscription "not authorized by the federal constitution." That the general government ought to empower the states to defend their own territory against foreign enemy. That the legislatures of the three states should authorize their governors to make detachments of militia or farm corps which should be ready for service in the state, or, on the application of a governor, to assist in defense in other states. The convention's views on amending the federal constitution savored of that nativism that afterwards developed into a great but short-lived American party. They held that no person not then naturalized should afterwards be eligible for a member of congress, or hold any civil office under the authority of the United States. Their one term for president had long been popular with nearly half of the voters in the union, though they went a step further and wished to provide that a state should not furnish two presidents in succession. They would require a vote of two-thirds of each house of congress for the admission of a new state, and would have representatives and direct taxes apportioned (as they now are) on the basis of the number of free persons in a state. This was of course aimed at the southern states, where the slaves were counted in a two-thirds ratio as representative people. The convention, with a view to the great commercial interest of the eastern states, desired that a vote of two-thirds in congress should be necessary to declare war or interdict commerce, except in case of an actual invasion. The convention met Dec. 15, 1814, and adjourned Jan. 5, 1815. There were 12 delegates from Massachusetts, 7 from Connecticut, 3 from Rhode Island, 2 from part of New Hampshire, and 1 from a county in Vermont—in all 25 persons.

HARTLEPOOL, a municipal and parliamentary borough, seaport, and market town of England, in the co., of Durham, is situated on a small peninsula, n. of the estuary of the Tees, 20 m. e. s. e. of Durham. It consists of one principal and several smaller streets, and was formerly surrounded by walls. The harbor is safe, and easily accessible; extensive docks have been constructed. Fishing is here carried on with success. Hartlepool formerly attracted many visitors for sea-bathing during the summer months; but since its recent commercial revival, owing to the formation of railways connecting it with the coal-mines of Durham, it is no longer visited for that purpose. In 1875 (including w. Hartlepool), 2,208 vessels, of 525,637 tons, entered, and 5,170, of 964,528 tons, cleared the port. In 1875, 5 iron steam-ships, of 3,995 tons, were built here. The

trade is chiefly in coal. As one of the Hartlepools, it joins in sending one member to parliament. Pop. of municipal borough ('71), 13,166.

HARTLEPOOL, WEST, a modern market town and seaport in the co. of Durham, situated 1 m. to the westward of the ancient borough of Hartlepool, and within the township of Stranton. It has sprung into existence within recent years, having been founded by Ralph Ward Jackson, esq., an enterprising railway speculator, in 1847. It consists of one principal and several diverging streets, and possesses a large and handsome Gothic church, several large hotels and dissenting chapels, a theater, athenæum, and mechanics' institute, custom-house, market-house, and other public buildings, and had in '71 a pop. of 21,110. The first harbor was constructed here in 1847, of 13 acres, and has since been enlarged to 44 acres. The first dock has a water area of 8 acres; the Jackson dock has 14 acres; and the Swainson dock, 10 acres. There are also large graving docks, timber-ponds, and about 3 m. of quays. The export of coal from the united port is about 1,500,000 tons annually. In 1866, a poor year, 575,899 tons were exported coastwise, and 903,611 to foreign ports. Besides coal, the following are the principal imports: Flax and hemp, grain, timber, butter, cheese, fruit, cattle, tallow, yeast, iron, zinc, etc.; the exports consisting of woolen, cotton goods, copper, cement, drugs, machinery, earthenware, yarn, hides, etc.; the trade being carried on for the most part with the Baltic ports, Cronstadt, St. Petersburg, and Dantzic, and with Hamburg and Rotterdam. Iron ship-building is carried on here to a large extent: in 1875, 7 steam-vessels, of 5,132 tons, and 3 sailing-vessels, of 1,886 tons, were turned out, making a total of 10 iron vessels of 7,018 tonnage. There are large iron-foundries, cement-works, locomotive engine and boiler works, mast and block lofts, saw-mills, tile-works, and brick-fields. The Hartlepool boroughs consist of Hartlepool, West Hartlepool, Throston, Stranton, and Seaton Carew, and send one representative to the house of commons.

HARTLEY, Sir CHARLES AUGUSTUS, b. England 1825; an engineer and railroad builder. He served through the Crimean war, as capt. of engineers in the Turkish contingent, in 1857 was made engineer-in-chief to the European commission of the Danube, and in 1862 was knighted by the queen. He has been concerned in a great number of enterprises in the line of his profession in the employ of the English, Russian, Turkish, and other governments.

HARTLEY, DAVID, a celebrated mental philosopher of last century, was b. Aug. 30, 1705. His father was vicar of Armley, in Yorkshire. At 15 he entered Jesus's college, Cambridge, and became a fellow of the college. He studied at first for the church, but his turn for original and independent thinking led him to dissent from some points in the 39 articles, and he, in consequence, had to adandon his original intention. What his precise difficulties were, we are not informed; we know only that, in his mature years, he impugned the eternity of hell-punishment, maintaining the ultimate restoration of the damned. In all other points his published opinions coincided with the church of England, and he continued to the last a member of the church. He finally chose the profession of medicine, in which he attained considerable eminence. He practiced as a physician successively at Newark, Bury St. Edmunds, in London, and at Bath, where he died on Aug. 25, 1757, at the age of 53 years.

His work on the mind, entitled *Observations on Man*, on which his fame rests, was begun when he was about 25, and occupied his thoughts for 16 years. It was published in 1749. The first part relates to the constitution of the human mind, and is the really important and original part. The second part treats of religion and morals, and might have been written by any orthodox clergyman, if we except the opinion above stated with reference to future punishment.

His handling of the mind turns throughout upon two theories or hypotheses, which have very different merits, and are by no means necessarily conjoined, although they are never separated in his mind. The first is called the doctrine of vibrations, or a theory of nervous action analogous to the propagation of sound, the suggestion of which he owed to Newton, of whose writings he was a devoted student. His second and most valuable innovation consisted in showing that the faculties, powers, and feelings of the mind might be explained to a very wide extent by the principle of the association of ideas (see ASSOCIATION OF IDEAS), a principle far from new in the statement of it, but never before appreciated in anything like the range of its bearings upon the phenomena of mind.

The doctrine of vibrations supposed that when any one of the senses is affected by an outward object, the effect was to set the particles of the nerve in a vibratory motion, which ran along to the brain, and produced corresponding vibrations in the cerebral substance. In like manner, when an active impulse proceeded outwards to the muscles, the manner of communication along the nerves was of the same kind. He even extended these molecular vibrations to the other tissues. As a hypothesis, this assumption was so far legitimate, if it served to explain the facts, or even to imagine in a probable way what goes on in the substance of the nerves and brain during the processes of sensation, thought, and volition. The distaste that has generally been entertained towards this part of Hartley's speculations, arose from a mistaken notion of its favoring materialism. Not only was the author not a materialist—being most express in affirming a spiritual entity different from the body—but his views had

nothing more of materialism in them than the views that mankind have always held as to the connection of mind with bodily actions.

As regards the second doctrine of Hartley, the doctrine of association, he was certainly the first to do justice to the applications of that principle to explain the phenomena of the mind. He points out how it is involved in the conversion of our sensations into ideas, throughout all the senses, and also in the first origin of voluntary power, which he truly regards as essentially an acquired power. He then treats of the commonly recognized intellectual faculties—memory, imagination, reason, etc.—showing how widely the process of association pervades them all. Lastly, the emotions, which he classifies under 6 heads—imaginative emotions, ambition, self-interest, sympathy, theopathy, (the religious sentiment), and the moral sense—may be readily seen to be, in a great many instances, the products of association, there being certain elementary feelings that unite among themselves, and pass into new connections, and give birth to complex feelings, under the general law. Many of those explanations would be considered now as faulty or defective; but at the time, Hartley's attempt was a great step in advance, and might have been much more fruitful in consequences to mental science, but for the unfortunate and mistaken prejudice excited by the vibration theory, which he carries out into every part of his exposition.

HARTMANN VON DER AUE, or VON AUE, one of the old German poets, b. about 1170, was a Swabian knight. He had probably begun the study of grammar, knew French when he joined the crusade in 1197, and, as he himself says, could obtain, by his own reading, material for his narrative poems. Of these the first was *Erec* (the legend reproduced in Enid of Tennyson's *Idyls of the King*), written shortly before 1197, and edited by Haupt (1839); the last was *Iwein*, written before 1204, and edited by Benecke and Lachmann (1827; 2d ed. 1843), with a dictionary by Benecke (1833). Both of these are drawn from the Arthurian cycle of legends; and their natural development of events displays a completer mastery of their material than the more incoherent British narratives which form their basis. Between the composition of these two poems, Hartmann wrote the religious legends, *Gregor auf dem Steine* (ed. by Lachmann, 1838), which was read in churches till the 16th c., and *Der arme Heinrich* (Longfellow's *Golden Legend*), which has been edited by W. Muller (1842), and also along with Hartmann's *Lieder und Büchlein*, by Haupt (1842). By these works, which have all been translated into modern German, Hartmann was known among his contemporaries. Gottfried von Strasburg, in his *Tristan*, written about 1207, praises him as still alive; and his death is lamented about 1220, by Heinrich von dem Türlein, in his *Krone*.

HARTMANN, EDUARD VON, a philosopher, b. in Berlin, 1840. Educated at the gymnasium and the school of artillery, he was commissioned as an officer in 1861; but the following year an accidental injury of his foot produced a disease which has proved to be incurable and has confined him to his room and, in a great degree, to his bed, where his time and thoughts have been devoted to philosophical inquiries. The principal work thus produced is *The philosophy of the unconscious*, in which taking his stand at the meeting point of the unconscious and the conscious, of natural science and philosophy, of the brain and the mind, he endeavors to trace and state the nexus between them. The unconscious in nature has, he says, both a will, which is not merely (according to Schopenhauer's theory) "irrational" but is able to determine itself to prototypal ideas; and also an idea which is not merely (according to Hegel's theory) "logical" but is capable of attaining reality by will. In the mind this unconscious will and idea are to be found in the "first principles," and are at work in the instincts, love, emotions, morals, æsthetics, and language. This book has awakened considerable interest in Germany and made its author eminent among the thinkers of the age. It is not yet evident, however, that he has solved the problem of the unconscious in nature, or of the nexus between the conscious and unconscious in man's complex being, though he has freshened the problem by setting it forth in novel terms.

HARTMANN, MORITZ, 1821–72; a German poet, b. Bohemia, of Jewish parents. He studied at Prague and Vienna, and, after a tour in Italy, Switzerland and south Germany, became a teacher in Vienna. He left Austria, to publish without danger a volume of poems entitled *Kelch und Schwert*, in which he gave expression to radical sentiments as regards both church and state. After residing for some years in Belgium and France, he came to Leipsic, where in 1847 he published *Neuere Gedichte*. Returning to Austria he suffered a short imprisonment, from which he was freed by the revolution of March, 1848. In the same year he was chosen to represent the district of Leitmeritz in the Frankfort parliament, where he took his seat on the extreme left. In Oct. he accompanied Blum and Fröbel to Vienna, but he made his escape before the execution of Blum, and took part in the deliberations of the "Rump Parliament" at Stuttgart. In 1849 he published the *Reimchronkik des Pfaffen Maurizius*, a satirical political poem in the style of the old chronicles. After the dissolution of the rump parliament he went to Switzerland, then to England and Ireland, and in 1850 to Paris, where, beside other literary engagements, he held that of correspondent to the *Kolnische Zeitung*. On the outbreak of the Russian war, he became correspondent of the same paper in the Crimea, where he remained 18 months. After several years' residence at Paris he settled in 1860 at Ghent, where he delivered courses of lectures on German literature and his-

tory in some of the principal academies. In 1863 he removed to Stuttgart to edit the *Freya*, and in 1868 he undertook editorship at Vienna of the *Neue Freie Presse*. Hartmann published several volumes of poems in addition to those mentioned, and besides his spirited accounts of his travels and adventures he is the author of various novels of more than average merit.

HARTO'GIA, a genus of trees, or shrubs, of the natural order *celestraceæ*. *H. capensis*, a native of the cape of Good Hope, is only 10 or 15 ft. high, but the trunk is a foot to a foot and a half in diameter. The wood is hard, fine-grained, close, and tough; it is much valued, and when polished, is superior to the finest mahogany. It is often used for veneering. The Dutch colonists call it *ladlewood*, probably from one of the first uses to which they found it convenient to apply it.

HARTRANFT, JOHN FREDERIC, b. Penn. 1830; graduated at Union college, and was admitted to the bar in 1859. He was an early volunteer on the union side in the war of the rebellion, and was aide-de-camp to gen. Franklin in the first battle of Bull Run. In July, 1861, he was in the Burnside expedition and led the 51st Pennsylvania regiment in the attack on Roanoke island, and in the battle near Newbern, in March, 1862. At Antietam he led his regiment in a brilliant and successful charge. After fighting gallantly at Fredericksburg he was ordered to Kentucky. In June, 1863, he was in command of a brigade at Vicksburg, and afterwards was with Sherman in the advance to Jackson, Miss. He was in other actions, particularly the battle of the Wilderness, and in May, 1864, became brig.gen. On March 25, 1865, he recaptured fort Steadman, before Richmond, displaying great bravery, for which he was brevetted maj.gen. After the war he was twice chosen auditor-general of Pennsylvania, and in 1872 was elected governor.

HARTSHORN, the term given in pharmacy to the antlers of the *cervus elaphus*. Its composition is very different from that of persistent horns, as those of the ox, for example, and is identical, or nearly so, with that of bone. The products of its distillation were formerly much used in medicine, under the titles of oil of hartshorn, volatile salt of hartshorn, spirits of hartshorn, etc.; but they are now replaced by simpler preparations of the active ingredients of these substances, namely, ammonia and carbonate of ammonia. See AMMONIA.

HARTSHORNE, JOSEPH, 1779–1850; b. Va.; studied medicine in Pennsylvania university, and graduated in 1805. After traveling in the East Indies he settled in Philadelphia, and became one of the surgeons of the state hospital. He was a member of the society of Friends, and his first ancestor in America was an associate with William Penn in the government of east Jersey. Two of his sons (Edward and Henry) are eminent as physicians and surgeons, and both have written largely on medical themes.

HART'S, or SPECTACLE, ISLAND, in Long Island sound, about 25 m. e. of New York. It is owned by the city, and on it are the industrial school, the city cemetery, a branch of the lunatic asylum, and a branch of the almshouse. The public burying-ground, or potter's field, receives annually nearly 2000 unidentified bodies. It contains only one monument, and that is to unknown soldiers. The industrial school, under the care of the commissioner of charities and correction, has usually 300 pupils.

HART'S-TONGUE, *Scolopendrium*, a genus of ferns, of which one species, *S. vulgare*, is a native of Britain, and is common in most parts of the country, in moist woods, shady banks, caves on the sea-shore, and other cold and damp situations. It is also found on the continents of Europe and in North America. It is very different in appearance from every other British fern, its fronds being, in general, quite undivided—although sometimes, by monstrosity, they are forked and even multipartite—linear, from a few inches to two feet in length, and from an inch to two or three inches in breadth. The *sori* are in transverse lines, on the lateral nerves. Fine plants of this fern have a very ornamental appearance, and are in their greatest luxuriance in winter.

HARTSUFF, GEORGE L., 1830–74; b. N. Y.; graduated at West Point; served on the frontier and in Florida, and was seriously wounded in a fight with the Seminoles. In the war of the rebellion he served with bravery until severely wounded at Antietam, being chief of staff to gen. Rosecranz, and brig.gen. In March, 1865, he was again in the field and took command of Petersburg after its capture. In 1871 he was retired with the rank of maj.gen.

HARTSVILLE, a village of Barthlomew co., Ind., 48 m. s.s.e. of Indianapolis. It is the seat of Hartsville college, organized in 1851 under charge of the Moravians, or United brethren.

HARTWICK, a village in Otsego co., N. Y., 68 m. w. of Albany on the Cooperstown and Susquehanna Valley railroad; pop. of town '75, 2,180. Near by is the Hartwick theological seminary, under Lutheran management. It has water power and a few manufactories.

HARTWIG, JOHN CHRISTOPHER, 1716–96; a German Lutheran preacher, chaplain in the English army, and on duty in America. He was in the first Lutheran synod held in the country in 1748; preached in several cities and towns, and was the founder of

Hartwick theological seminary, Hartwick, N. Y. It is said that he predicted at the age of 40 that his death would occur (as it did) on his 80th birthday

HARTZENBUSCH, JUAN EUGENIO, a modern Spanish dramatic poet of German extraction, was b. at Madrid, Nov. 6, 1806, studied under the Jesuits, and produced his first work, *Amantes de Teruel*, in 1836. His principal works since then, all of which have been published at Madrid, are *Doña Mencia* (1838); *La Redoma Encantada* (1839); *La Visionaria* (1840); *Alfonso el Casto* (1841); *Primero Yo* (1842); *Honoria* (1842); *El Buchiller Mendarias* (1842); *La Coja y el Encogido* (1843); *La Madre de Pelayo* (1846), and *El mal Apostol* (1864). He has also published prose works: *Cuentos y Fabulas* (1861); *Obras Escogidas* (1863); and *Obras de Encargo* (1864). His writings are characterized by glowing imagination, vigorous diction, and sonorous versification. Hartzenbusch is considered one of the most original of the living poets of Spain. He is also one of the few who possess any solid knowledge of German literature.

HARUGARI, an order in the United States, composed chiefly of Germans started in 1847, and supposed to number over 20,000 members. Its aims are social and benevolent, and particularly the preservation of the German language. There are a general or national lodge, state lodges, and about 240 subordinate lodges.

HÂRÛN, surnamed, AL-RASCHÎD, i.e., the just, the most renowned of the Abbaside caliphs, succeeded his elder brother, Haudi, in the caliphate, in the year 786, not having yet attained his twenty-first year. Various insurrections in the interior of the kingdom were speedily put down, and the wars against the Byzantines and the Chasars brought to an end. Though the boundaries of the vast empire, which extended from the Caucasus to the sources of the Nile, were not enlarged, the empire lost none of its provinces. Hârûn gave himself up unreservedly to the pleasures of life, leaving the entire administration of his extensive kingdom in the hands of Yahya, the Barmecide, and his four sons; and the energy of their administration, the enforcement of order, and the general prosperity of the country proved that his confidence was not misplaced. His capital city of Bagdad he rendered the most flourishing city of that period. Tribute was paid to him from all quarters, and splendid edifices were erected by him at a prodigious cost. At the same time, he was the patron of learning, poetry, and music, and his court was the resort of the most eminent Mohammedans of the age. He was celebrated in countless songs and narratives; and is the hero of several of the stories in the *Arabian Nights*. Towards the end of his reign, he conceived a rooted hatred towards the Barmecides (see BARMECIDES); yet so well did he know their tried fidelity, that he suffered the reins of government to remain in their hands for some years afterwards. In 803 he caused the vizier, his four sons, and all their descendants, one only excepted, to be executed, not even excepting his favorite Jaafer, who had been his companion in his nocturnal rambles through the streets of Bagdad. On the destruction of this family, his affairs fell immediately into irretrievable confusion; treason and rebellion, no longer dreading the far-reaching arm of the able vizier, showed themselves in every corner of the empire; and now, when it was too late, Hârûn thought with bitter regret of his savage cruelty to that able family. The most formidable of these insurrections having broken out in Khorassan, in the n.e. of the empire, Hârûn marched in person against the rebels. But an attack of apoplexy obliged him to remain behind in Tûs, where he soon afterwards died, in the month of March, 809. The tales of the *Arabian Nights* have thrown a false halo round his memory, for though he was undoubtedly the most enlightened monarch of the age, yet, like the most of the Abbaside race, he could, when it suited him, act to perfection the part of the avaricious and bloody tyrant.

HARUSPICES. The word *haruspex*, or *aruspex*, is probably derived from an old Latin word, *haruga*, a victim, or *hira*, intestines, and the root *spec-*, to see or look. The haruspices seem to have come originally from Etruria, whence the Romans derive many of their religious institutions. Their art, *haruspicina*, which in many respects was like that of the Augurs (see AUGURIES AND AUSPICES), consisted in interpreting the will of the gods by inspecting the entrails of the animals offered in sacrifice (hence they are also called *extispices*), and by observing other circumstances connected with the offerings, such as the willingness or unwillingness of the victim to come to the altar, the flame, the smoke, etc. They took indications also from earthquakes, lightning, and all other extraordinary phenomena of nature called *portenta*. The haruspices did not equal the augurs in dignity and respect; they were regarded rather as *media* of communication with heaven, than as possessing any independent religious authority. They had no organization, like the augurs; they did not, in earlier times, at least, form a *collegium*, nor had they a *magister*. They were, however, at one time considered of great importance; but latterly their art fell into disrepute with the more intelligent portion of the Roman citizens. Cato is alleged to have said that "he wondered that one haruspex did not laugh when he saw another." Some of the later emperors, especially Alexander Severus, endeavored to revive and encourage the art of the haruspices, but it was finally abolished by Constantine. Their sacred books were called *libri haruspicini*, *fulgurales*, and *tonitruales*.

HARVARD, JOHN, 1608–38; b. England, and educated at Cambridge university. In 1637 he emigrated to Massachusetts where he was made a freeman, and performed

the duties of a minister. By his will one-half of his estate was given towards founding a college, and his books were given to the prospective library. The bequest was about $4,000, and in 1642 Harvard college was opened under the name of its chief donor.

HARVARD COLLEGE, the oldest college in the United States, often termed a university, was founded at Cambridge, Mass., 3 m. from Boston, in 1636, only six years after the settlement of the colony, £800 having been appropriated in three sums for the support of "a schoale or colledge." In 1639 this "schoale" was named Harvard college, in honor of the rev. John Harvard, who gave it £700. It has been well endowed by private liberality, chiefly that of the merchants of Boston, and has, besides its valuable landed property, 1,000,000 dollars of invested funds. At its first establishment this now flourishing college was little more than an Indian school. Many Indian youth were received, but only one ever graduated. They were found utterly unfit for the life, pursuits, and studies of civilization, and those partly educated went back to their forests and wigwams. The first president of Harvard was the rev. Henry Dunster, 1640. In 1764 the library was destroyed by fire; the only works saved being an oriental collection, bequeathed by Dr. Lightfoot, and the Greek and Roman classics, presented by bishop Berkeley. In 1848 a scientific department was generously endowed by Abbott Lawrence, for the benefit of persons who do not wish to pursue the full course. The government is vested in the president, five fellows, and treasurer, with a board of overseers, elected by and from among the alumni of the university. Connected with the college are seven professional schools of law, theology, medicine, science, mining, dentistry, and agriculture. The buildings of the university, consisting of halls, dormitories, chapels, museum, etc., are very extensive. There were, in 1874, 110 professors and tutors, 1174 students, and libraries of 200,000 volumes.

HARVARD COLLEGE (*ante*), or more properly HARVARD UNIVERSITY, by which title the institution has been known for many years past, comprehends the following departments: The college proper, the Lawrence scientific school, the divinity school, the law school, the medical school, the dental school, the botanic garden and herbarium, the Bussey institution of agriculture and horticulture, the Peabody museum of American archæology and ethnology, the museum of comparative zoology, the astronomical observatory, and the library. Of these the college proper, or the academical department, is of course the oldest, dating from the original foundation of the institution in 1636; the medical department, established in 1782, is the next in age; then follows the divinity school, established in 1817, at the time of the Unitarian controversy in Massachusetts. The other departments are of more recent establishment, the law school having been founded in 1817, but opened in its present building in 1832; the Lawrence scientific school in 1848, and the dental school in 1868. The museum of comparative zoology and the Peabody museum of American archæology and ethnology, though connected with the university, are affected in their relation to it by peculiar provisions, being responsible in some degree to separate governing boards. The astronomical observatory and the library have been regarded as separate departments of the university system only during the past few years. The government of the university is vested in two bodies, the corporation and the board of overseers. The corporation is made up of the president, the treasurer, and five fellows, the president and treasurer being chosen by the fellows, who are a self-perpetuating body. The corporation initiates all measures concerning the college, is responsible for the care of its funds, and elects the officers of instruction and government in the various departments, subject to the ratification and final action of the board of overseers. The board of overseers, originally consisting of the congregational ministers in Cambridge and the adjoining towns, was subsequently elected by the state legislature, but since 1866 has consisted of 30 of the alumni of the university, five of whom are elected annually for the term of six years. The president of the university is president of the faculties of the several departments, each of which has a distinct dean. All the departments enumerated above are located in Cambridge, with the exception of the medical and dental schools, and the Bussey institution, which are in Boston. The buildings are for the most part situated on a level plain in Old Cambridge, 3 m. w. of Boston. Those used as dormitories for the students are Hollis hall, Stoughton hall, Holworthy hall, Thayer hall, Weld hall, Matthews hall, Gray's hall, Holyoke house, and college house. Boylston hall, Harvard hall, university hall, Massachusetts hall, Holden chapel, and Seaver hall, are employed either for recitation rooms or for laboratory or other miscellaneous use. The Lawrence scientific school, the law school, the divinity school, the Peabody museum, the museum of comparative zoology, the observatory, and the botanic garden, have one building each for their respective uses. The Hemenway gymnasium was completed in 1880. The largest and costliest of the university buildings is Memorial hall, erected 1870–76 as a memorial of the students of the university who fell in the union army during the rebellion. This building consists of three parts: the memorial vestibule, containing tablets giving the names of the dead, the large dining hall, surrounded with portraits and busts of the benefactors of the university; and Sanders theater, in the semi-circular auditorium of which the commencement and other leading public exercises of the university are held. Memorial hall cost about $500,000, and is the largest single college edifice in the world, the dining hall alone, it is claimed, being one-third larger than the largest of the English university

halls. The other buildings of the university are the medical and dental schools, in Boston proper, and the building of the Bussey institution, near Jamaica plain, within the Boston city limits. The oldest building is Massachusetts hall, built in 1720; the most recent is Seaver hall, built in 1880. The general arrangement of the buildings in the college yard in Cambridge is in the form of quadrangles, of which the western one is now completed, while the eastern is being gradually filled up. The university owns a brick house for the president. The library is housed in Gore hall, which aims to be a copy of king's college chapel, in Cambridge, England, and which has recently been considerably enlarged. Wadsworth house is the name which has of late years been given to the old president's house, within the college yard, occupied by the presidents of the university from 1726 to 1849, but now rented by the college as a dormitory for professors and students. Appleton chapel occupied for daily morning prayers during the academic year, and for Sunday services for those students not having other church connections, was built in 1858.

The course of study in the college proper is of four years, and leads to the degree of bachelor of arts, but the elective system of studies has been employed at Harvard to a far greater extent than in any other American college, the required studies being virtually limited to the freshman year. Even in mathematics the lecture system largely takes the place of the old method of instruction by text books. The course in the law school, leading to the degree of bachelor of laws, has recently been extended to three years; and in the medical school three full years of study are now required of candidates for the degree of doctor of medicine. The course in the scientific school is four years, in the dental school two years, and in the divinity school three years; while in the other departments the length of study is not rigidly prescribed. The university at present confers no degrees on students without examination, one year of study being a pre-requisite to the degree of master of arts, two years to that of doctor of philosophy, and two years to that of doctor of science. The number of candidates for these three degrees—established during the past decade—is usually about sixty. The examinations, however, are so rigid that the number of degrees annually conferred is much smaller than this figure. The whole number of officers of instruction and government is about 150. The number of students in all the departments of the university has for the past few years exceeded 1300, of which about 800 have been in the college proper. Of these, considerably more than half are from the state of Massachusetts. The whole number of alumni of the college proper (to 1879) is 9,175; the number of graduates of all departments (to 1875) is 12,812. The amount of the invested funds of the university, exclusive of the value of the grounds, buildings, books, and apparatus, was, Aug. 31, 1879, $3,902,181.73. The whole number of bound volumes in the college library and the department libraries is about 200,000, of bound volumes, and pamphlets, about 500,000. The present president of Harvard university is Charles William Eliot, LL.D., a graduate of the class of 1853. He was elected to the office in 1869, and to his administration have been chiefly due the distinguishing changes which have marked the recent management of the university, especially in the introduction of the elective system in the college proper and in lengthening the term of study required in the law and medical schools. The government of the university, which, for a generation after the schism which divided the New England Congregational churches in the first quarter of the present century, was under Unitarian control, is now neutral in its attitudes towards religion.

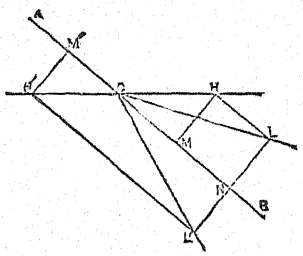
HARVEST (Ger. *herbst*, autumn; probably allied to Gr. *harp-*, Lat. *carp-*, to snatch, pluck, gather), the season of gathering and storing the chief products of the fields. The most important harvest operations are those connected with the cutting down of the grain crops, in which, as well as in the mowing of hay (q.v.), machines moved by horses are now extensively used. See REAPING.

HARVEST BUG, *Leptus autumnalis*, is an animal of the *acarus* tribe, which derives its popular name from its attacking the laborers employed in the harvest. As the acari in their perfect state are usually provided with eight feet, and in their larval stage with only six feet, and as the harvest bug has only the latter number, it was suspected by Siebold, and it has been since proved, that this animal is the larva of one of the trombidida, a family of acaridans. It is so minute, that, were it not for the brilliancy of its color, which is a vivid crimson, it would be quite invisible. It makes its appearance, or rather renders us conscious of its presence, about the middle of July, and disappears towards the middle of Sept., and is most plentiful in hot dry seasons. It occurs on the blades of grass, and on various plants in fields, gardens, and woods, and attacks not only man, but the dog, cat, etc. Persons with delicate skins are its special prey, and it seems to prefer the legs, the under part of the thighs, and the lower part of the abdomen. The wound it inflicts—how produced is not well understood—occasions insupportable irritation, which usually leads the victims to scratch themselves, and thus to increase the inflammation. The skin becomes swollen and red, and sometimes even purple; and the minute vesicles caused by these animals sometimes terminate in suppuration.

HARVEST-FLY, the popular name in the United States for species of *cicada* (q.v.) which are common in that country, and make their appearance as winged insects in the

season of harvest. *C. septemdecim* is called the *seventeen years' locust*, from a popular belief that it lives for that period in its larval state, a belief which seems to have arisen from the appearance of these insects in unusual numbers at intervals of about seventeen years. Its color is black, the wings and wing-covers veined with orange red. Near the tips of the wing-covers there is a dusky zigzag line in the form of the letter W, on account of which the appearance of this fly in great numbers is superstitiously regarded as indicative of approaching war.

HARVEST MOON. In our latitudes, at the time of full moon nearest the autumnal equinox, it happens that the moon rises for several days nearly at sunset, and about the same time by the clock, instead of rising, as it usually does, 52′ later on one day than on the preceding. This phenomenon is owing to the fact, that at this time the moon is in Aries, when the part of the ecliptic below the horizon makes the least angle with it, as shown in the following figure, where AB represents a portion of the equator; H′CH, a portion of the horizon; CL, a portion of the ecliptic when C represents the equinoctial point of Aries; CL′, a portion of the same if C were the equinoctial point of Libra. Then (supposing the moon to move in the ecliptic, a supposition not far from the truth, and one which greatly simplifies the explanation of this phenomenon), if the moon be at C (point of Aries) on one night, it will have retrograded to L by the same time on the following night; and, by the revolution of the earth in the direction of NM′, will appear on the horizon at H, and the distance LH reduced to time will give the moon's retardation. If C be the equinoctial point of Libra, then L′ will be the moon's position on the second night, and it will rise at H′ after the earth has revolved so as to carry the whole of the line H′L′ above the horizon; this line, when reduced to time, gives the retardation. Hence, as the moon when at the full is in Aries at the sun's autumnal equinox, and in Libra at the sun's spring equinox, the retardation is least in the first instance and greatest in the second, being respectively CN — CM, and CN + CM′ = CN + CM. In the latitude of Edinburgh (55° 58′) the greatest retardation is 1 hour 8′ 24″, and the least 11′ 44″; in lat. 64° 27′, the least retardation is zero, or the moon rises at the same time on two successive evenings, while at the arctic circle (67° 30′) it rises 4′ earlier on the second evening. As this phenomenon occurs at a time (about Sept. 23) when the farmer is busy with his harvest, and very opportunely supplies him for several evenings with light sufficient to continue his operations after sunset, the moon at this stage has received the name of "harvest moon." As the moon's orbit is inclined to the ecliptic, this irregularity will be increased or diminished according as the ascending node is between Capricorn and Cancer, or between Cancer and Capricorn. It is nothing at the equator, increasing as we proceed north. At our antipodes the greatest retardation occurs in Sept., and the least in March.



HARVEY, a co. in s. central Kansas on the Little Arkansas river, crossed by the Atchison, Topeka and Santa Fé railroad; 540 sq.m.; pop. '78, 8,107. It has a level surface and is nearly all prarie. Soil fertile, producing corn, wheat, oats, etc. Co. seat, Newton.

HARVEY, Sir GEORGE, P.R.S.A., an eminent artist, was b. at St. Ninians, near Stirling, in 1806. Displaying a taste for drawing, he was at the age of 18 placed in the school of the trustees' academy, Edinburgh, where he made rapid progress. In 1826, when the royal Scottish academy was instituted, he was elected an associate, and in 1829 an academician. He was a constant contributor to the academy's exhibitions, and many of his works are well known through the medium of engravings. The principal of these are—"Covenanters Preaching," "Battle of Drumclog," "The First Reading of the Bible in Old St. Paul's," "The Curlers," "Columbus discovering America," and "Quitting the Manse." Harvey did not confine himself to historical art, some of his most successful works being representations of Scotch scenery. His landscapes are remarkable for pastoral peace, and some of the more imaginative for a singular solemnity of atmospheric effect. He was elected president of the royal Scottish academy in 1864, and knighted in 1867. He died in 1876.

HARVEY, WILLIAM, the discoverer of the circulation of the blood, was b. at Folkstone, in Kent, on April 1, 1578. His father was a yeoman; and five of his brothers were merchants of weight and substance, *magni et copiosi*, in the city of London, while the sixth sat as member of parliament for Hythe.

After six years' attendance at the grammar-school at Canterbury, Harvey, being then 16 years of age, was entered at Caius college, Cambridge. He took his first degree in arts in 1597, and having selected physic for his profession, left Cambridge about the year 1590, and proceeded to the university of Padua, then the most celebrated school of medicine in the world. Having passed five years at that school in attendance on the lectures of Fabricius de Aquapendente, Julius Casserius, and other eminent men, who then adorned that university, he obtained his diploma as doctor of medicine in 1602. He returned to England in the same year; and after receiving his doctor's degree from

his original university, Cambridge, settled in London as a physician. In 1609 he was appointed physician to St. Bartholomew's hospital, and in 1615 Lumleian lecturer at the college of physicians—an office then held for life; and it is generally supposed that in his first course of lectures (in the spring of 1616) he expounded those original and complete views of the circulation of the blood with which his name is indelibly associated. It was not till the year 1628 that he gave his views to the world at large, in his celebrated treatise entitled *Exercitatio Anatomica de Motu Cordis et Sanguinis* (4to, Franc.), having then, as he states in the preface, for nine years or more gone on demonstrating the subject in his college lectures, illustrating it by new and additional arguments, and freeing it from the objections raised by the skillful amongst anatomists. Shortly after Harvey's election as Lumleian lecturer (in 1617 or 1618), he was appointed physician-extraordinary to James I., and in the beginning of 1630 was engaged "to accompany the young duke of Lennox in his travels beyond seas." In 1632 he was formally chosen physician to Charles I.; and in 1633 we find that his absence, "by reason of his attendance on the king's majesty," from St. Bartholomew's hospital was complained of, and that Dr. Andrews was appointed as his substitute, "but without prejudice to him in his yearly fee or in any other respect"—a procedure which shows the esteem in which Harvey was held. We learn from Aubrey that he accompanied Thomas Howard, earl of Arundel, in his embassy to the emperor in 1636; and during this journey he publicly demonstrated to Caspar Hofmann, the distinguished professor of Nuremberg, and one of the chief opponents of his views, the anatomical particulars which made the circulation of the blood a necessary conclusion—a demonstration which, it is reported, was satisfactory to all present save Hofmann himself, who still continued to urge futile objections. He attended the king in his various expeditions, and was present with him at the battle of Edgehill (Oct. 23, 1642). "During the fight," says Aubrey, "the prince and duke of York were committed to his care. He told me that he withdrew with them under a hedge, and tooke out of his pockett a booke, and read. But he had not read very long before a bullet of a great gun grazed on the ground neare him, which made him remove his station." He accompanied the king after the battle to Oxford, where, according to the same authority, "he came several times to our college (Trinity), to George Bathurst, B.D., who had a hen to hatch eggs in his chamber, which they opened daily to see the progress and way of generation;" and where the honorary degree of doctor of physic was conferred on him in the Dec. of that year. In 1645 he was, by the king's mandate, elected warden of Merton college; but on the surrender of Oxford to the parliament in July, 1646, he left the university, and returned to London. He was now 68 years of age, and seems to have withdrawn himself from practice, and from all further participation in the fortunes of his royal master. During the remainder of his life, he was usually the guest of one or other of his brothers, now men of wealth and high standing in the city; and it was at the country-house of one of them that Dr. Ent visited him at Christmas, 1650, and after "many difficulties" (see Dr. Ent's epistle dedicatory, in Willis's translation of Harvey's works) obtained from him the MS. of his work on the generation of animals, which was published in the following year, under the title of *Exercitationes de Generatione Animalium, quibus accedunt quædam de Partû, de Membranis ac Tumoribus Uteri, et de Conceptione*, 4to.

From this period to the time of his death, the chief object which occupied his mind was the welfare and improvement of the college of physicians, to the buildings of which he erected a handsome addition at his own cost. In 1654 he was elected, in his absence, president of the college, but he declined the office, on account of his age and infirmities. In July, 1656, he resigned his Lumleian lectureship, which he had held for more than forty years; and in taking leave of the college, presented to it his patrimonial estate at Burmarsh, in Kent, then valued at £56 per annum. He did not long survive, but, worn down by repeated attacks of gout, died at London, June 3, 1657, and was buried in a vault at Hempstead, in Essex, which his brother Elia had built.

A handsome edition of Harvey's works, in Latin, revised by Drs. Lawrence and Mark Akenside, was published by the college of physicians in 1766. The best edition, in English, is that of Dr. Willis, published by the Sydenham society in 1847.

HARWICH, a municipal and parliamentary borough, seaport, and market-town of England, in the co. of Essex, is pleasantly situated on an elevated and healthy site near the n.e. extremity of a promontory 66 m. n.e. of London. Southward from the town extends an esplanade, from which fine views of the harbor and the German ocean may be obtained. The chief branches of industry are the manufacture of Roman cement, and of artificial manure from coprolites (q.v.), fishing, and shipbuilding. Steamers run daily to Ipswich, and in summer there is steam communication with London. The harbor of Harwich, formed by the junction of the Stour and the Orwell, is said to be the best on the e. coast of England. It is capacious, safe, and commodious; but its entrance is rocky, and, although there are two lighthouses and numerous buoys, cannot be entered without careful navigation. Harwich has been made a harbor of refuge. The battery by which the town is defended was erected about 1820, at which time a considerable space intervened between it and the usual tide-mark; but so great have been the encroachments made by the sea on the promontory on which Harwich stands, that two jetties or groins, 1350 ft. and 1000 ft. long respectively, have been

constructed to prevent its nearer approach; and these have proved very successful. In 1875, 878 vessels of 239,738 tons entered, and 897 of 223,021 tons cleared the port. Pop. '71, 6,079.

HARZ MOUNTAINS, a broad mountain-range in the n. of Germany, extends e.s.e. from Goslar and Osterode in Hanover to Hettstädt and Mansfield in Prussian Saxony. It forms an elevated plateau, covered with irregular and, for the most part, forest-clad mountains, and situated mainly in Hanover and Brunswick. The range, which is divided into upper and lower Harz, is 50 m. in length, about 16 m. in breadth, and covers a superficies of upwards of 750 sq. miles. It is composed for the most part of greywacke belonging to the Devonian formation, and broken through in one or two places by granite, as in the Brocken (q.v.) and the Rammberg. The highest peak of the range is the Brocken. The Harz mountains are exceedingly rich in metals and minerals. Silver, iron, lead, copper, zinc, etc. are mined; marble, alabaster, and granite are quarried. Mining, stone-cutting, and the timber-trade afford employment to the inhabitants, who are about 76,000 in number. The Harz mountains are the scenes of many of the wild legendary tales of German literature.

HASAN AND HUSEIN, the title of a passion-play, performed annually throughout India and Persia by a traveling company of Shiah Mohammedans. The title of the piece presents also the names of its heroes, two brothers nearly related to Mohammed, the first of whom was caliph after Ali, the son-in-law of Mohammed. The two brothers, in whom rested the title to the office of guardian of the caaba or temple of Mecca, were foully assassinated, which act gave rise to the formation of the party known as Shiah, or "sectarian" Mohammedans, and produced a schism in Islam, which exists to this day.

HASDRUBAL, more correctly ASDRUBAL (*one helped by Baal*), a name of frequent occurrence in Carthaginian history, there being nearly twenty more or less celebrated individuals so called. One of the best known is that son-in-law of Hamilcar (see HAMILCAR BARCA), who accompanied his father-in-law to Spain (236 B.C.), and for eight years after the death of the latter, continued to carry out the plans of his great kinsman. The empire which the military talent and energy of Hamilcar had founded was consolidated by the skillful statesmanship of Hasdrubal. He formed the s. and e. coasts of Spain into Carthaginian provinces, and founded many towns, the most famous of which was Carthago Novo (now *Cartagena*), possessing a fine harbor, and having in its neighborhood rich mines. This city he adorned with a splendid "royal palace." Under his direction, agriculture flourished; mining was vigorously prosecuted; the tribes as far north as the Ebro became subject to Carthage, and paid tribute: and powerful chiefs were attached to Carthaginian interests by intermarriage and other means. Hasdrubal was at length (220 B.C.) murdered by a slave, whose master he had put to death. He was a leader of the popular party at Carthage after the conclusion of the first Punic war, and was early brought out into public life. He was a skillful general, and showed great energy and prudence in a war with the Numidian tribes. But his talents were more particularly administrative, as has been already seen in his Spanish government. So powerful was he in Spain, and so independent of the home government, that the Romans made the famous treaty in regard to the Iberus as the common frontier not with the Carthaginians, but with Hasdrubal.

Another Hasdrubal, brother of the great Hannibal, and son of Hamilcar Barca, bore a conspicuous part in the second Punic war, first as the opponent of the Scipios and the conqueror of Cn. Scipio in Spain, and afterwards as the commander of a Punic army in Italy. While he was marching southward to join Hannibal in Umbria, he encountered the Roman consuls, C. Nero and M. Livius, at the river Metaurus. The Romans gained a complete victory; an immense number of the Carthaginian forces were slain; and Hasdrubal himself, when he saw that all was lost, rushed into the midst of the enemy, and fell (207 B.C.) as became the son of the great Hamilcar. In generalship and in military bravery he seems to have been little inferior to his father and brother.

A third Hasdrubal was one of Hannibal's principal officers in his Italian campaigns, and largely contributed, by a well-timed charge, to decide the victory on the great day of Cannæ.—A fourth, called Calvus, i.e., the Bald, led an expedition to Sardinia in 215 B.C., during the second Punic war. He was defeated by the Roman general, and carried to Rome as a captive.—A fifth, son of Gisco, co-operated with Hasdrubal, son of Hamilcar, in Spain, and afterwards, in conjunction with Syphax, unsuccessfully opposed Scipio in Africa (204 B.C.).—The last we shall mention is that unfortunate general to whom fell the hopeless task of defending Carthage against the Romans in the third Punic war. He was at first commander without the city (another Hasdrubal, grandson of the Numidian Masinissa, being general within the city), but he ultimately became sole leader, and opposed all the plans and movements of Scipio with great energy and skill. But at length Carthage fell, and Hasdrubal was carried prisoner to Rome, to adorn the triumph of his conqueror.

HASÉ, KARL AUGUST, an eminent living theologian of Germany, was b. at Steinbach, in Saxony, Aug. 25, 1800, and, after leaving Altenburg gymnasium, studied theology at Leipsic, Erlangen, and Tübingen. For taking part in the *Burschenschaften*, he was, after a tedious trial, confined for five months in the fortress of Hohenasperg.

In 1829, after having been *privat-docent* for a year, he was made extraordinary professor of philosophy in Leipsic, where his lectures on dogmatics and the life of Christ proved especially attractive. He was, indeed, the first critical biographer of Christ who decidedly rose above the old rationalistic conception of Him as merely an excellent moral teacher, his *Leben Jesu* (1829, 5te Aufl. 1865), which appeared six years before Strauss's, having proposed as its aim to show "how Jesus of Nazareth, according to divine destination, by the free act of his own spirit, and by the opportunities of his time, became the Savior of the world." Vindicating equally the rights of the individual religious consciousness, and the historical importance of the church, he opposes modern supernaturalism, as in *Die Leipziger Disputation* (1827), equally with extreme rationalism, as in *Theologische Streitschriften* (1834–37), and *Die Tübinger Schule* (1855). Before the first year of his professorship in Leipsic was over, Hasé was called as professor of theology to Jena, where he still represents the departments of dogmatics and church history principally. His *Hutterus Redivivus* (1827, 10th ed. 1862) seeks to do justice to the old Lutheran dogmatics in contrast with modern systems, by exhibiting its harmonious completeness, and is in extensive use among German theological students. Besides his *Compendium of Universal Church History* (1834, 9th ed. 1867), which has been translated into English, and is unsurpassed for its concise pictures of times, men, and systems, Hasé has treated special portions of church history in *Die beiden Erzbischöfe, Neue Propheten, Franz von Assisi* (1856), and *Das geistliche Schauspiel* (1858). He has also published several works on ecclesiastical law; an edition of the *Libri Symbolici Ecclesiæ Evangelicæ; Ideale und Irrthümer* (1872); etc.

HASHISH' is the oriental name of the plant (or rather of the tops and tender parts of the plant) which is scientifically known as *cannabis indica*, and which we term *Indian hemp*. The medicinal value of the preparations of Indian hemp is described in another article. See HEMP, INDIAN. It is the peculiar intoxication occasioned by the use of hashish that will be now specially noticed.

Various preparations of the plant are employed for the purpose of producing the desired effect. A favorite mode of extracting its active principle is by boiling the tops and flowers with water, to which butter or oil has been added, evaporating, and thus forming an oleaginous solution or fatty extract. This fatty extract is frequently mixed with other substances which are reputed to possess aphrodisiac properties, and is taken in the form of electuary confection, or pastil. The *majoon* used at Calcutta, the *mapouchari* employed at Cairo, and the *dawames* or *dawamesc* of the Arabs, are preparations of this kind.

Dr. Moreau of Tours, who has written an elaborate work on this subject (*Du Hachisch et de l'Alienation Mentale*, 1845), which is based not only on general observation but on personal experience, thus describes the *fantasia*, which is the term employed in the Levant to describe the excitement produced by this agent: "It is really *happiness* which is produced by the hashish; and by this I imply an enjoyment entirely moral, and by no means sensual, as we might be induced to suppose. The hashish-eater is happy, not like the gourmand or the famished man when satisfying his appetite, or the voluptuary in the gratification of his desires, but like him who hears tidings which fill him with joy, like the miser counting his treasures, the gambler who is successful at play, or the ambitious man who is intoxicated with success." (P. 54).

One of the first appreciable effects of the drug, is the gradual weakening of the power of controlling and directing the thoughts. Then comes the stage already described; and accompanying, and in part following it, there are observed errors of sense, false convictions, and the predominance of one or more extravagant ideas. These ideas and convictions are generally not altogether of an imaginary character, but are suggested by external impressions which are erroneously interpreted by the perceptive faculties. Finally, if the dose is sufficiently powerful, there is a complete withdrawal of the mind from external things.

HASKELL, a co. in n. Texas on the Brazos river; 1000 sq. miles. There are as yet no considerable settlements; the census of 1870 returned "no population."

HASLAR HOSPITAL. See GOSPORT.

HASLINGDEN, a small manufacturing and market-town of England, in the co. of Lancashire, is situated in a mountainous district, on and around an eminence 18 m. e.s.e. of Preston. It has a town-hall and mechanics' institute, buildings of recent erection, and a parochial chapel, a handsome edifice, the front of which is 300 years old. There are also chapels and meeting-houses for Baptists, Methodists, Independents, and Primitive Methodists. Cotton and woolen manufactures are extensively carried on. In the vicinity are coal-mines and stone-quarries. Pop. in '71, 7,698.

HASP AND STAPLE, in Scotch law, the ancient form of entering an heir in a burgage subject, i.e., properly situated in a burgh. The heir was made to take hold of the hasp and staple of the door, as a symbol of possession, and then enter and bolt himself in. This form is no longer necessary.

HASSAN, a district of Mysore, India, bounded on the s.w. by the Madras district of south Kanara, and on the s. partly by the state of Coorg, 3,291 sq.m.; pop. '71, 669,971. The main portion of the district consists of the river basin of the Hemavati and its

tributaries. It naturally divides into two portions, the Melnad or hill country, which includes some of the highest ranges of the west Ghats, and the Maidan or plain country, sloping towards the south. The Hemavati which flows into the Cauvery in the extreme s. is the great river of the district; its most important tributary is the Yagachi. The upper slopes of the w. Ghats are abundantly clothed with magnificent forests, and wild animals of all sorts abound. Among the mineral products are kaolin, feldspar, and quartz. The soil of the valleys is a rich red alluvial loam.

HASSAN-BEN-SABAH, the "Old Man of the Mountain" of European story, was founder of the sect of the Assassins (q.v.), likewise denominated Hassanis or Ismanilians.

HASSARD, JOHN R. G., b. New York 1836; graduated at St. John's (Jesuit) college. In 1865 he edited the *Catholic World*, and in 1866 joined the editorial staff of the *New York Tribune*. He published the *Life of Archbishop Hughes* soon after the death of that prelate. He has gained repute as a graphic correspondent, and also as a musical critic of rare capacity and judgment. In the summer of 1876 Mr. Hassard attended the remarkable musical festival at Baireuth, the performance of Wagner's *Nibelungen Ring*, under the direction of the composer, and wrote perhaps the most complete description and criticism of the performance, for the *New York Tribune*, in which he also described with great brilliancy, the centennial exhibition, 1876, and the Cincinnati musical festival, 1878.

HASSAUREK, FRIEDRICH, b. Austria 1832; was in the revolution of 1848, and wounded. The next year he came to America and settled in Cincinnati as a lawyer, afterwards went into journalism, and became prominent as a politician. He was U. S. minister in Ecuador 1861–5, and published his observations (1868) in *Four Years Among the Spanish Americans*. He is, at present (1880), editor of the Cincinnati (O.) *Volksblatt*.

HASSELQUIST, FREDRIK, 1722–52; a Swedish naturalist and traveler. In 1741 he entered the university at Upsala, where his taste for the study of nature was fostered and developed by Linnæus, and where, in 1747, he obtained license in medicine, and published a thesis entitled *De Viribus Plantarum*. On account of the frequently expressed regrets of Linnæus at the lack of information regarding the natural history of Palestine, Hasselquist resolved to undertake a journey to that country, and, a sufficient subscription having been obtained to defray expenses, he, after making himself acquainted with the languages of the Levant, embarked for Smyrna, where he arrived 1749. He visited parts of Asia Minor, Egypt, Cyprus and Palestine, and made large natural history collections; but his constitution, naturally weak, gave way under the fatigues and anxiety of travel, and he died at Smyrna, on his way homewards. His collection reached home in safety, and five years after his death the result of his wanderings were published by Linnæus under the title of *Resa till Heliga Landet förrättad från år* 1749 *till* 1752. The work is divided into two parts, the first consisting of the traveler's journal and letters, and the second of his remarks on the botany, zoology and mineralogy of the countries through which he passed, with observations on the prevalent diseases and their cure, and the state of industry, commerce and the arts. It was translated into French and German in 1762, and into English in 1766.

HASSELT, a t. of Belgium, capital of the province of Limburg, is situated near the center of the province, on the left bank of the Demer, 17 m. w.n.w. of Maastricht. It is well built, is surrounded by walls, and carries on a considerable trade in distilling, and in the manufacture of linen fabrics, lace, and tobacco. Pop. '70, 10,500.

HASSLER, FERDINAND RUDOLPH, 1770–1843; b. Switzerland. He came to America when young, and in 1807 was professor of mathematics in the West Point military academy. He was the first superintendent of the U. S. coast survey, and for many years was chief director of that important work. He was afterwards at the head of the bureau of weights and measures in the treasury department. Among his publications are text-books on science, *System of the Universe*, and valuable reports to congress on weights and measures and other topics.

HASSLER EXPEDITION. The name given to the U. S. coast survey expedition of 1871, on board the steamer *Hassler*, so called in honor of the first superintendent of the coast survey. The expedition included prof. Agassiz, Dr. F. Steindacher of Vienna, ichthyologist; Dr. Thomas Hill of Cambridge, botanist and photographer; Dr. White of Philadelphia, photographer and chemist; J. H. Blake of Cambridge, draughtsman and collector, and L. F. Pourtales of the coast survey, as superintendent of dredging. Mrs. Agassiz was also one of the party. The steamer left Boston Dec. 4, 1871, stopping at St. Thomas, Barbadoes, Pernambuco, Rio Janeiro, Montevideo, San Mathias bay (Patagonia), Possession bay (straits of Magellan), and various other places in the straits; on the coast of Chili, at San Carlos, Lota and Talcahuana; the island of Juan Fernandez, Valparaiso, Caldera, Pisco, Callao, Payta, the Galapagos islands, Panama, Acapulco, Magdalena bay, San Diego, and lastly San Francisco, arriving in Aug., 1872. Reports were made and published of the zoological results of the expedition, but the death of prof. Agassiz prevented the publication of his own valuable scientific observations.

HÂSTINAPURA is the name of the ancient capital of the Kurus (see KURU), frequently mentioned in the Mahâbhârata. The Vishnu-Purâna relates that it was founded by Hastin, washed away by the Ganges—under the reign of Nichakra, who, in consequence of this event, had to remove the seat of his government to Kausâmbi—and at a later period it was undermined by Balarâma. It was situated on the Ganges, and is placed by Lassen, in his map to the *Indische Alterthumskunde*, about 78° l. long. and 28° 50′ n. lat.

HASTINGS, a co. in central Ontario, Canada, traversed by the Grand Trunk railway; 2,337 sq.m.; pop. '71, 48,364. There are many small lakes and streams. Gold has been found. Chief town, Belleville.

HASTINGS, a parliamentary and municipal borough, market-town, and famous watering-place of England, in the co. of Sussex, is picturesquely situated on the shore, and surrounded on all sides except the s., which is open to the sea, by high cliffs. It is distant about 35 m. e. of Chichester, and 74 m. s.e. of London by rail. It consisted formerly of only two streets, intersected by a small stream called the Bourne; but is now a considerable town, many new streets and terraces having been erected within the present century. Stretching westward along the sea-front of the town is the Marine parade, a spacious terrace, which, joined and continued westward by the Grand parade of St. Leonards-on-Sea, forms one of the finest sea-walks in the kingdom. Formerly an insignificant village, situated a mile w. of Hastings, St. Leonards is now the Belgravia of that town, is united with it by lines of handsome houses, and included with it in the population returns. The chief point of interest in Hastings is the ruin of an ancient castle, standing on the summit of the West cliff, and supposed to have been erected previous to the Norman invasion. Fishing is the chief occupation—about 160 boats are employed. Owing to the want of a harbor, the boats have to be pulled up on the beach by means of a rope and windlass worked by horse-power. Hastings is a great resort of pulmonary invalids during the cold season of winter and spring; and in summer has facilities for bathing, though probably less desirable as a residence at this season than many other towns on the southern coast.

Hastings in the beginning of the 10th c. was of sufficient importance to have a mint. Here, as is well known, the Conqueror landed in 1066, and in the immediate vicinity are trances of a camp, said to be that occupied by the Normans on the night previous to their march against the Saxons. (See BATTLE). Under the Confessor, Hastings became a member of the Cinque ports, after which it long continued in great repute for its ship-building. It has returned two members to the imperial parliament since the reign of Edward III. Pop. '71 of parliamentary borough, 33,337.

HASTINGS, a city and seat of justice in Dakotah co., Minn,. at the junction of Vermillion river with the Mississippi, on the Chicago, Milwaukee and St. Paul, and at the terminus of the Hastings and Dakotah railroads, 20 m. s.s.e. of St. Paul; pop. 3,644. The city has a court-house, nearly a dozen churches, three newspapers, and a large number of manufactories. There is a railroad bridge across the Mississippi.

HASTINGS, according to the French chroniclers, the name of a viking or sea-rover of the 9th c. It is uncertain whether he was born in Norway, Denmark, or France, most probably in the second of these countries. The story of his devastations is something appalling. From his youth on to a gray old age his whole delight appears to have been in pillage, rapine, and bloodshed. The shores and cities of France, Spain, Portugal, and Italy are said to have been repeatedly wasted and burned by him and his savage comrades. As the Scandinavian *sagas*, however, speak of several Hastings, the Danish historian Suhm considers that the French chroniclers—who wrote at a much later period—have gathered up the confused fear-begotten traditions of the s.w. of Europe, relating to all the pirates of this name, and applied them to a single personage, who has thus become in their hands rather a type of the ferocious Norse viking, than a historical individual.

HASTINGS, FRANCIS RAWDON, Marquis of; 1754–1826, b. England. He joined the army in his 17th year, and his life thenceforth was entirely spent in the service of his country. From 1773 to 1782 he was engaged with much distinction in the American war, fighting at Bunker hill, Monmouth, Camden, and in other battles. From 1783 to 1813 he held various high appointments at home, and took an active part in the business of the house of lords; from 1813 to 1823 he was governor-general of India, and succeeded in bringing to a happy conclusion the Nepaul war. In 1824–26 he was governor of Malta.

HASTINGS, THOMAS, 1784–1872; b. Conn.; when 12 years old removed to Clinton, N. Y. He became interested in sacred music, and made its study and improvement the chief business of his life. From 1824 to 1832 he edited a religious paper in Utica; then came to New York city as musical instructor and composer, where he published, among other works, *Spiritual Songs*, *Christian Psalmist*, *Mother's Hymn Book*, *History of Forty Choirs*, and *Elements of Vocal Music*.

HASTINGS SAND, the lower division of the Wealden beds, forming a portion of the lower cretaceous period. It consists of a considerable thickness (1000 ft.) of sand, calciferous grit, clay, and shale; and differs very little from the Weald clay, the

upper division of the series, except in being a little more arenaceous. The strata have been deposited in shallow fresh water. The sand often exhibits fine specimens of ripple-marks, and the clay which separates the sand-beds sometimes contains cracks that have been produced by the drying of the bed on exposure. The strata are highly fossiliferous. There are numerous saurian reptiles, including the huge iguanodon and the flying pterodactyl. The remains of several chelonians also occur. The fish belong chiefly to the ganoid or placoid orders, the most remarkable being the lepidotus, whose conical palate teeth and thick square enameled scales are very frequent. The shells belong to genera which inhabit fresh water, such as Paludina, Cyclas, and Unio.

HASTINGS, WARREN, gov.gen. of India, b. Dec. 6, 1732, was descended from an ancient family long settled at Daylesford, in Worcestershire. He was early left an orphan; but when only seven years old, he resolved to recover the manor and estate, which had passed out of the possession of his family. He was sent to Westminster school, and promised to be one of the first scholars of his age, when, at 17, he was sent out to India as a writer in the East India company's service. Having realized a moderate fortune, he, in 1764, returned to England. In 1769 he again visited India, on his appointment as member of the council at Madras, and in 1772 was promoted to be president of the supreme council of Bengal. A year later, parliament enacted that the chief of the presidency of Bengal should be styled gov.gen. of India, and that Hastings should be the first gov.general. The finances of his government were in a disordered state, yet the demands of the East India company for money were incessant. His first step was to wrest certain rich provinces from the great mogul, and to sell them to Sujah Dowlah, the nabob of Oude. The Rohillas resented the transfer to a cruel master, and Hastings, for a money consideration, infamously lent the nabob the services of the company's army for their subjugation. The great brahman, Nuncomar, was put to death by his influence, in order to strike terror into the native population. He exacted vast sums from Cheyte Sing, the rajah of Benares, and finally confiscated all his possessions. He formed a treaty with Asaph-ul-Dowlah, the son of Sujah Dowlah, under which the mother and grandmother of the nabob, known as the begums or princesses of Oude, were to be stripped of their domains and treasures for the benefit of the company. These were the chief blemishes of his Indian administration; but against these are undoubtedly to be set off great public services. He was constantly trammeled by orders from home, and frequently borne down by an able and factious majority in council; yet he preserved the British empire in India from a formidable combination of foreign and domestic enemies. He acted with vigor when the war with France broke out; he broke the power of Hyder Ali; he organized a system by which justice was dispensed, the revenue collected, and peace maintained. He encouraged Asiatic learning. When he left India in the spring of 1785, that great empire was tranquil. A treaty had been concluded with Tippoo Sahib, son and successor of Hyder, and the Carnatic had been evacuated by the armies of Mysore. On his arrival in England, he was received with distinction by George III. and the court. The directors acknowledged his services by a unanimous vote of thanks. The whig opposition were, however, loud and vehement against him, and succeeded in carrying in the lower house a motion for his impeachment at the bar of the house of lords. The trial began in Westminster hall, Feb. 12, 1788, the managers of the impeachment being Burke, Fox, Sheridan, Windham, and Mr. Charles (afterwards earl) Grey. Burke opened the proceedings in a speech which was extended over four sittings; Mr. Fox and Mr. Grey urged the charge respecting Cheyte Sing; and Mr. Sheridan was intrusted with the conduct of the article relating to the princesses of Oude. The interest taken by the public in the impeachment began to decline after these great displays of rhetoric. The trial, notwithstanding, languished for upwards of seven years. On the 149th day (April 23, 1795), it terminated in the acquittal of Hastings. Out of 400 peers, only 29 voted. The last 24 years of his life were passed at Daylesford, where, in the pursuits of literature, and the occupations of a country gentleman, the evening of his eventful, stormy, and checkered career was serenely passed. He died Aug. 22, 1818, in his 86th year, and was buried behind the chancel of the parish church of Daylesford. Few students of English literature require to be reminded of the eloquence with which the story of his life and his memorable impeachment has been told by lord Macaulay.

HAT, a well-known species of head-covering, which has assumed various shapes and characters. What we understand by a hat is a fabric of felt (q.v.), or a silk material used as a substitute for felt. Hats are only a variety of the still more ancient cap and bonnet, and were at first made of velvet, silk, and other rich materials. Formed of felt, and assuming a certain firmness of fabric, hats began to be manufactured in England about 1510, and we hear of them superseding caps, or softer headgear, in the reign of Elizabeth. The felting of caps is, however, said to have been long known anterior to this period; and there is a tradition that a knowledge of felted caps or hats had been introduced by the crusaders. Wool was the material first employed in forming felt hats; but in time, as trade with America was developed, the fur of the beaver (q.v.), as finer and softer, came into use; hence, the term beaver was long synonymous with hat. For about three centuries, fine beaver hats, dyed black, and prepared with much skill, formed the head-covering of the higher classes in Great Britain; the middle and humbler

classes, still continuing, for a length of time, to use the less expensive caps and bonnets according to the fashions of their ancestors. See BONNET.

The growing scarcity of beaver-fur led to attempts to substitute a cloth formed of silk plush, drawn over a pasteboard frame, about 1810. These were not very successful; and hats of wool or beaver-felt were common until about 1840. The high cost of beaver at length forced on the improvement of silk hats, and now the beaver is almost entirely superseded; while the fabrication of silk hats has been carried to great perfection not only in England, but in continental countries and the United States. The silk hat consist of a body and rim, usually made of two or three layers of cotton-cloth saturated with varnishes, to give the fabric stiffness, and make it waterproof. These are molded on wooden blocks according to the fashion of the day; and when the desired shape is produced, the whole is carefully furnished over with lac and dammar varnish, and, before dry, the fine silk plush is applied with great nicety, so as to prevent the seams being perceived; it is then trimmed with silk braid on the edge of the brim, and a silken band round the junction of the body with the brim; and the lining of leather and thin silk being put in, it is complete. Lightness, gloss, and durability are the prime qualities of the silk hat; and in these respects the hats of New-York manufacture deserve a high commendation. Very excellent hats are made in London, Paris, and Edinburgh; but they are heavier than those of America.

As suggested by the whims of fashion (q.v.), hats have undergone a wide variety of changes of shape. The raising of the top part in which the head is inserted, and the widening or diminishing of the brims, have constituted the chief differences. Sometimes the top has been high and narrow, sometimes high and widened; and as regards the brim, it has sometimes been so broad as to be looped up. Political and religious differences have been marked by the form of hat. The Puritan of the reign of Charles I. adopted the steeple hat, high and narrow with a broad brim, and devoid of ornament, as the badge of his party. The Cavalier, during the same era, wore a lower and broader crown, with a feather stuck on one side. And a still lower-crowned hat, with a profusion of feathers, became the fashion in the reign of Charles II. The Quaker hat, low in the crown, with a broad brim, and quite plain, dates from the origin of the sect at the middle of the 17th century. A growing extravagance in breadth of brim led to the device of looping up the back and sides, and so was fashioned the cocked-hat which was worn by gentlemen throughout the 18th century. But in this cocked-hat era there were exceptions to the fashion. Beaux, by way of singularity, wore low-crowned hats with brims, and such must be considered the precursors of the present round-hat, which finally superseded every variety of cocked-hat at the beginning of the 19th century. The writer of this can recollect of only three persons wearing cocked-hats as ordinary attire as late as 1810. While cocked-hats ceased to be used by common soldiers at the reform of military costume consequent on the war with the French republic, officers in the army continued till a later period to wear that species of flattened cocked-hat known as the *chapeau bras*—that is, the hat which, by being flattened up, could be carried conveniently under the arm. This kind of hat was disused by regimental officers about 1812; but with slight variation in shape, it is still continued by field officers in European armies.

Light, handy, and, in effect, adding height to the stature, the common round-hat is easily damaged, and quite unsuitable for rough wear in traveling or when in the country. These inconveniences, as is well known, have led to the introduction of a variety of undress hats, black and gray, and some of them of felt almost as soft as cloth. Such are the wide-awakes, the Tom-and-Jerries, and an innumerable tribe of hats worn by sportsmen, tourists, and youths generally. With these exceptions, the round-hat, with slight changes of form from time to time as suggested by fashion, continues to be the hat proper, worn by all when in ceremonial dress. The only professional hat in England is that of clergymen of the established church. It is a round-hat of fine beaver, with a broad brim, which is looped up at sides and back, so as to form a kind of shovel. This is ordinarily known as the shovel-hat. During the 18th c., it was not unusual for the gentlemen to wear gold-lace bands and edgings on their hats. This, like some other fantastic decorations of attire, is now resigned to footmen and other domestic servants in livery, whose hats and other garments present a fair specimen of the dress of our foppish ancestors.

HATCH, EDWARD, b. Me.; early removed to Iowa. In the war of the rebellion he was a col. in command at New Madrid, Island No. Ten, and Corinth, and afterwards commander of a division in Tennessee. He was brig.gen. of cavalry in the contests at Franklin and Nashville, and in the pursuit of Hood's army. In 1866 he was made col. of the 9th U. S. cavalry.

HATCH, JOHN P., b. New York, 1822; a graduate of West Point; served in the Mexican war and against the Indians. In the war of the rebellion he was brig.gen. of volunteers, commanding cavalry in northern Virginia, and was seriously wounded at South Mountain. He was brevetted maj.gen. for gallantry. After the war he was made col. of the 4th (regular) cavalry.

HATCH—HATCHWAY. Hatches are square or oblong openings in the deck of a ship, forming the communications between one deck and another. The fore-hatchway

is usually close abaft the fore-mast, the after-hatchway between the main and mizzen masts, and the main-hatchway immediately before the main-mast. This last is ordinarily the largest, and through it goods are hoisted to and from the hold. In merchant vessels, and especially barges, there are frequently other hatchways, according to the nature of the cargo; indeed, in some craft, the whole deck consists of hatchways. When used for purposes of communication, a companion-ladder is placed from each hatchway to the deck below. These ladders are, however, generally limited to the fore and after hatches. As he emerges through the latter, in ascending to the upper deck, every officer and sailor touches his hat in token of "salute to the quarter-deck." When not so used, the hatchway is covered by a wooden grating which admits air and sufficient light to those below, while it protects men operating above from accident. During stormy or wet weather, these gratings are covered with tarpaulins, securely fastened, and the ship becomes water-tight. After an action by boarding, the conquered crew are often battened down in the lower decks, and then made prisoners as they are allowed to ascend through the hatchway one by one.

HATCHIE, a river which rises in the n.e. part of Mississippi, U. S., and empties into the Mississippi river, near Randolph, about 25 m. above Memphis, Tenn. It runs through a fertile cotton region, and is navigable by small steam-boats about 100 m. from its mouth.

HATCHMENT, or ACHIEVEMENT, the funeral escutcheon placed in front of the house of the deceased, or elsewhere, setting forth his rank and circumstances. It is in the form of a lozenge, and in its center are depicted the arms of the deceased, single or quartered.

The achievement of a *bachelor* represents his arms in a shield complete, i.e., accompanied with helmet, crest, mantling, motto, and any other external ornaments to which he may be entitled, on a black ground.

In the achievement of an unmarried lady, her arms are placed in a lozenge on a black ground, but without external heraldic ornaments except in the case of a peeress, when her supporters, robe of estate, and coronet are added.

The achievement of a husband whose wife survives, impales his arms with his wife's in a shield with the external ornaments to which he is entitled, the ground of the hatchment being, under his side of the shield, black, and under his wife's, white. If the wife be an heiress, her arms are not impaled, but carried in an escutcheon of pretense. The external ornaments are appended, except the insignia of any order of knighthood having a circle or collar, with which heralds do not consider it proper for a knight to encircle his wife's arms. On this account the achievement of a knight has two shields placed side by side, one containing the husband's arms only, encircled by the collar, ribbon, etc., of the order, the other containing those of husband and wife: the ground is divided perpendicularly in the middle of the second shield, and painted black and white. When the wife is a peeress in her own right, there are also two shields—the dexter containing the arms of the husband, with the lady's arms on an escutcheon of pretense ensigned with her coronet; the sinister lozenge-shaped with the lady's alone, and each accompanied with its proper external decorations. The ground is divided black and white in the middle of the dexter escutcheon.

The arms of a wife whose husband survives are impaled with her husband's arms in a shield, or, in the case of an heiress, borne on an escutcheon of pretense. There is no helmet, crest, or mantling, but a peeress is entitled to her robe of estate. The ground under the dexter side of the shield is white, and under the sinister, black.

The achievement of a widower differs from that of a husband, in the ground being entirely black.

The achievement of a widow differs from that of a wife, both in having the ground entirely black, and in the form of the escutcheon, which (except in the case of an escutcheon of pretense) is lozenge-shaped. The arms are encircled by a silver cordon or cordelière, the symbol of widowhood.

On the decease of the last of a family, a death's head surmounts the shield in place of a crest.

The achievement of a reigning king or queen, whether married or not, represents the royal arms complete on a ground entirely black. That of an archbishop or bishop has the insignia of his see impaled with his paternal arms, the whole surmounted by a mitre, and the ground is per pale ar. and sa. The dean of a cathedral or collegiate church and a king at arms, also impale the arms of office with their family arms. In the achievement of the wife of a prelate, there are two shields—the first containing the impaled arms of the see and the bishop, surmounted by a miter; and the second, the family arms of the bishop with those of his wife. The ground is all white, except that part which is under the arms of the wife.

The funeral escutcheon of Scotland, France, and Germany differs considerably from that in use in England; it indicates not merely the deceased's right to a coat of arms, but his gentility of descent. The hatchment is much larger, consisting of a lozenge above 6 ft. square; and the arms of the deceased, which occupy the center, are surrounded by those of the 8 or 16 families from whom he derived his descent, the paternal quarterings on the right side, and the maternal on the left. The deceased is not entitled to an

achievement unless all these families had a right to bear arms. On the four corners are death's heads and the initials and title of the deceased, the black interstices are powdered with tears.

HATFIELD, a small market t. of England, in the co. of Hertford, is situated on the slope of a hill, 7 m. s.w. of the town of Hertford. It consists of one considerable street, crossed by a smaller one; its trade is unimportant. The palace was once the property of the bishops of Ely, but, together with the manor, was seized by Henry VIII., and was afterwards successively the residence, before their accession, of Edward VI. and queen Elizabeth. Hatfield house, built by sir Robert Cecil, is a noble structure, and a fine specimen of Elizabethan architecture. The parish church is an old and interesting edifice of the 13th century. Pop., '71, of parish, 3,998.

HATFIELD, EDWIN FRANCIS, D.D., b. N. J., 1807; graduated at Middlebury college, and studied theology at Andover. He was ordained in New York in 1832; was pastor in St. Louis; then of the Seventh, and later of the North Presbyterian church, New York city. He was for a time agent for the Union theological seminary, and for many years clerk of the Presbyterian general assembly. He has published *Universalism as it Is; St. Helena and the Cape of Good Hope; The History of Elizabeth, N. J.; The Church Hymn-Book, with Tunes; The Chapel Hymn-Book.* He also edited *The New York Observer Year-Book* for 1871 and following years.

HAT MANUFACTURE (see HAT, *ante*). Until recent times hats were principally made by the process of felting, and as tradition ascribed the discovery of that very ancient operation to St. Clement, he was assumed as the patron saint of the craft, and the annual festival of the trade continues to be held on his day, the 23d of November. Felt hats are now made of three different kinds, plain soft, plain hard, and "napped" or "ruffed" felts. There is a great range in the quality of felt hats, the finer and more expensive qualities being made entirely of fur; for the commoner qualities a mixture of fur and Saxony wool is used; and for the lowest kinds wool alone is employed. The processes and apparatus necessary for making hats of fur differ also from those required in the case of woolen bodies; and in large manufactories, especially in America, machinery is generally employed for operations which at no distant day were entirely manual. In the smaller factories, and for special objects, the old hand processes are still in operation. Hatter's fur consists principally of the hair of rabbits (technically called coneys) and hares, with some proportion of nutria, musquash, and beaver's hair; and generally any parings or cuttings from furriers are also used. Furs intended for felting are deprived of their long, coarse hairs, after which they are treated with a solution of nitrate of mercury, an operation called carroting or *secretage*, whereby the felting properties of the fur are greatly increased. The fur is then cut by hand or machine from the skin, and in this state it is delivered to the hat maker. A considerable trade in rabbit fur for hat making is maintained between Great Britain and the United States. The silk hat, which has now become so co-extensive with civilization, is an article of recent general introduction. It was known in Florence about a century ago; but its manufacture was not introduced into France till about 1825, and its development has taken place entirely since that period. A silk hat consists of a light stiff body covered with a plush of silk, the manufacture of which in a brilliant glossy condition is the most important element in the industry; and in that manufacture the French and American styles are in large demand. Originally the bodies were made of felt and various other materials, but now calico is almost exclusively used. The calico is first stiffened with a varnish of shellac, and then cut into pieces sufficient for crown, side, and brim. The side-piece is wound round a wooden hat block, and its edges are joined by hot ironing, and the crown piece is put on and similarly attached to the side. The brim, consisting of three thicknesses of calico cemented together, is now slipped over and brought to its position, and thereafter a second side-piece and another crown are cemented on. The whole of the body, thus prepared, now receives a coat of size, and subsequently it is varnished over, and thus it is ready for the operation of covering. In covering this body, the under brim, generally of merino, is first attached, then the upper brim, and lastly the crown and side sewed together are drawn over. All these by hot ironing and stretching are drawn smooth and tight, and as the varnish of the body softens with the heat, body and cover adhere all over to each other without wrinkle or pucker. Dressing and polishing, by means of damping, brushing, and ironing, come next, after which the hat is "velured" in a revolving machine by the application of haircloth and velvet velures, which cleans the nap and gives a smooth, and glossy surface. The brim has then only to be bound, the linings inserted, and the brim finally curled, when the hat is ready for use. In all kinds of hat-making the French excel, and in such centers as Anduze, Lyons, and Paris the trade is very extensive and important. In Great Britain the felt hat trade is principally centered at Denton and other localities in the neighborhood of Manchester, and in America the states of New York and New Jersey enjoy the greater part of the industry. According to the census of 1870 the statistics of hat manufacture in the United States were as follows: Hat and cap establishments, 483; hands employed, 16,173; capital, $6,489,571; wages, $6,574,490; materials, $12,262,107; products, $24,848,167.

HAT MONEY, a small duty or primage paid to the master of a ship for his care and trouble over and above the freight. The right to it is regulated entirely by custom of particular ports. The name is probably derived from the payment being originally gratuitous, and given to the master on going round with the hat at the end of a prosperous voyage.

HATRAS', a t. of Hindustan, in the n.w. provinces, 33 m. to the n. of Agra, in lat. 27° 36′ n., and long. 78° 9′ east. Hatras contains, '71, 23,722 inhabitants, and has a considerable trade, more particularly in the cotton of the neighborhood. As a place of some strength, it was at one time prominent in the wars of the Doab; but on falling, in 1817, into the possession of the British, it was immediately dismantled.

HATTERAS, CAPE. See CAPE HATTERAS.

HATTI SHERÍF, sometimes called HATTI HUMAYUN—i.e., exalted writing, the name given by the Turks to every rescript of the sultan. The hatti sherifs are composed in the Turkish language, and written in the Arabian court-hand Diváni. Above the text, as a token of the authenticity of the rescript, stands the intricate flourish or mark of the sultan, usually in black, but sometimes in red or gold. This flourish is called tugra or rishâni sherif—i.e., exalted sign; and the functionary who superscribes it is called rischândschi, or the signer. The hatti sherif is irrevocable. That of Gulhana, promulgated by Abdul Medjid, Nov. 3, 1839 (renewed Feb. 18, 1856), which guarantees life and property to all subjects of the empire without distinction of creeds, has in modern times obtained the widest celebrity.

HATTO, the name of two archbishops of the see of Mainz, who have a somewhat conspicuous place in the history of Germany. The first of these was chosen archbishop of Mainz in 891, and died in 913.—The second archbishop of that name was a monk of the monastery of Fulda, and succeeded the celebrated Rabanus Maurus, well known in the history of the eucharistic controversies, as abbot of the monastery of St. Boniface, about the year 942. In the second expedition of the emperor Otho I. into Italy, in 961, Hatto was sent as his ambassador from Pavia to Rome; and after his return, on the death of archbishop William, he was raised to the see of Mainz, and continued one of the chief directors of the imperial counsels. Of his after-life, and of his personal character, the most opposite accounts have been given. By some he is represented as a zealous reformer, and an upright and successful administrator; by others, as a selfish and hard-hearted oppressor; and the strange legend of his being devoured by rats, which Southey has perpetuated in his well-known ballad of *Bishop Hatto,* is represented as an evidence of the estimate which was popularly formed regarding him. It is by no means improbable, however, that this legend is of a much later date, and that its real origin is to be traced to the equivocal designation of the tower on the Rhine, Maüsethurm, near Bingen, which has been selected as the scene of the occurrence. *Maüsethurm,* mouse-tower, is probably only a corrupted form of *Mauththurm,* toll-tower, a sufficiently descriptive name; but the modified form of the word might readily suggest a legend of mice or rats. The date at which the Maüsethurm was built is unknown, and it is far from certain that it is not much later than the time of Hatto. It was stormed by the Swedes in 1635. Archbishop Hatto died in 969 or 970.

HATZFELD, a small t. of Austria, in the Temeser Banat, is situated 24 m. w. of Temesvar, on the railway between that town and Pesth. The breeding of horses is here extensively carried on, and there is a large trade in corn. Pop. in '69, 7,981.

HAU'BERK, a twisted coat of mail, sometimes extending only as high as the neck, but more generally continued so as to form a coif, leaving only the face of the knight who bore it exposed. In early times, the sleeve of the hauberk sometimes terminated at the elbow, but in the 13th and 14th centuries it came down to the wrist, and very generally descended over the hand in the form of a glove, either one-fingered or divided. In the 14th c., the hauberk was worn under plate-armor. See HABERGEON.

HAU'BERT, an old term in feudal law, to denote the tenure of ward and relief.

HAUCH, HANS CARSTEN, one of the best Danish poets of the 19th c., was born at Frederikshald, in Norway, in 1791; graduated at the university of Christiania in 1821; and after having traveled through Germany, Italy, and France at the cost of the government, with a view of prosecuting the study of natural history, came to Copenhagen in 1827, and was appointed professor of physics at the royal academy of Soroe, in Denmark. This post Hauch exchanged in 1846 for the chair of northern literature in the university of Kiel, but on the breaking out of the Sleswick-Holstein revolution, two years afterwards, he was compelled to return to Copenhagen, where the dowager-queen, Maria Sophia, offered him an asylum at the palace of Frederiksborg, where he resided for several years; and on the death of his friend Oehlenschläger, in 1850, he succeeded him in the chair of æsthetics at the university of Copenhagen. Hauch's earliest attempts at dramatic composition—*Contrasterne* and *Rosaura*—which appeared in 1816–17, attracted very little attention, but his tragedies of *Tiberius og Bajazet, Gregory VII.,* and *Don Juan* (1829) at once established his reputation, which he fully maintained by his subsequent dramas of *Karl den Femten's Död* (the death of Charles V.), *Mastrichts Belejring* (the siege of Maestricht), *Svend Grathe* (1841), and *Marsk Stig* (1850), in which he exhibits great powers of individualizing character, and portraying the local coloring of the scenes

which he describes. Many of his pieces were translated by himself into German, and were represented with success at the principal theaters of Germany and Sweden. Hauch's dramatic epic, *Hamadryaden*, which belongs to the ultra romantic school, has met with less favor among his own countrymen than in Germany, where it elicited the commendatory notice of Tieck, Schubert, and other critics of note; but his *Lyriske Digte*, 1842 (lyrical poems), some of which are extremely beautiful, enjoy an undisputed popularity in Denmark. As a writer of tales and romances, Hauch showed considerable diversity of talent; the principal are—*En Polsk Familie* (a Polish family); *Slottet ved Rhinen* (the castle on the Rhine); and *Guldmagern* (the goldsmith, 1836–45); *Saga om Thorwald Vidfœsle* (1849); *Nordische Mythologie, Waldemar Seier* (1862), etc. His *Robert Fulton* (1853) is regarded as the most perfect of his works. Hauch was a voluminous contributor to current Danish and German literature, and in his own country his name is associated with a sharp literary contest, in which he took an active and not always a very dignified part against his countryman and brother poet, J. L. Heiberg. He died at Rome in 1872.

HAUGIANS, a sect in Norway, the followers of Hans Neilson Hauge (1771–1824). He was an enthusiastic revival preacher and so annoying to the regular clergy that they procured his punishment by fine and imprisonment. He held that the ministry is a common duty, and that ordination for the service is not necessary; that church creeds and confessions are of small account, but faith and works are everything, and he laid much stress upon strict discipline. The sect, though local, is still numerous.

HAUKSBEE, or HAWKSBEE, Francis, b. England about 1690; a natural philosopher, the earliest to note electrical attraction and repulsion, and to observe the production of light in a vacuum and in open air. He wrote *Physico-Mechanical Experiments on Various Subjects.*

HAUPT, Herman, b. Penn. 1817; graduated at West Point, and after obtaining his commission, immediately resigned from the army, and became a civil engineer, and in 1844 was professor of that science in Pennsylvania college. He was for many years engaged as first assistant engineer on the Pennsylvania railroad, and afterwards rose to be chief engineer, and a director of that company. He was chief engineer of the Hoosac tunnel. During the war of the rebellion he was chief of the bureau of military railroads. In 1875 he was general manager of the Piedmont air line railway.

HAUPT, Moritz, 1808–74; b. Germany; a noted philologist. On finishing his university course he devoted seven years to study of Greek, Latin, German, Old French, Provençal and Bohemian. In 1837 he became a teacher at the university of Leipsic, and his first lectures, dealing with such diverse subjects as *Catullus* and the *Nibelungenlied*, indicated the two-fold direction of his labors. He was chosen to the new chair of German language and literature, founded in his behoof, and in 1842 married Louise Herman, the daughter of his master and colleague. Having taken part in 1849 with Otto Jahn and Theodor Memmsen in a political agitation for the maintenance of the imperial constitution, he was deprived of his professorship. Two years later, however, he was called to succeed Lachmann at the university of Berlin; and at the same time the Berlin academy, which had made him a corresponding member in 1841, elected him an ordinary member. For 21 years he held a prominent place among the scholars of the Prussian capital.

HAUPTMANN, Moritz, 1792–1868; was well known as a composer, but of greater importance as a writer on the theory of music. He was educated as a musician, and under Spohr he studied the violin. His opera, *Mathilde*, was very successful, but it was not until he succeeded Johann Sebastian Bach, as cantor at the Thomas school of Leipsic that his genius as a teacher was universally acknowledged. His pupils, all more or less distinguished, cherished an enthusiastic admiration for him, and at his death Leipsic was in mourning. He embodied the result of many years' labors in his *Die Natur der Harmonik und Metrik.*

HAUPUR', a t. of British India, in the n.w. Provinces, in the district of Meerut, 20 m. s. of the town of that name. It is of considerable size, and had a population in 1871 of 14,294. Government has a breeding-stud here, which has obtained celebrity for the character of the horses passed into different branches of the service.

HAURAN, a district in Syria, e. of the Jordan and s. of Damascus. It is a volcanic region, and scattered over it are the ruins of a vast number of ancient towns. The land belongs to the government; it is fertile, but only grain is cultivated. Scarcely a tree can be seen. The country abounds in artificial caves which once served as cisterns or granaries. Eshmiskin is considered the capital, and is the residence of the chief of all the shieks. The people are chiefly Mohammedans and dress like the Bedouins. In ancient times the Hauran was one of the four provinces of Bashan.

HAURÉAU, Jean Barthélemy, b. France, 1812; after leaving college, became an editor at Le Mans. In 1848 he was made keeper of the manuscripts in the national library, and chosen a member of the constituent assembly. In 1861 he became librarian of the order of advocates, and president of the academy of inscriptions and belles lettres. Among his works are *De la Philosophie Scolastique; François I. et sa Cour; Charlemagne et*

sa Cour; and *Gallia Christiana*, a continuation of the Benedictine history of Christianity in Gaul.

HAURIANT, a term in heraldry applied to a fish placed upright as if to refresh itself by sucking air. Gules, three lucies (the ancient name of pikes) hauriant in fess argent, the arms of a family of the name of Lucy in Hertfordshire.

HAUSER, KASPAR, the foundling of Nuremberg, was found by a citizen of that town in the market-place, between four and five o'clock in the afternoon of the 26th May, 1828. He was dressed like a peasant-boy, and had with him a letter addressed to the capt. of the sixth regiment of horse at Nuremberg. Being conducted to this officer and interrogated, it soon became evident that he could speak very little, and was almost totally ignorant. To all questions he replied, "Von Regensburg" (from Regensburg), or "Ich woais nit" (I don't know). On the other hand, he wrote his name in firm legible characters on a sheet of paper, but without adding the place of his birth, or anything else, though requested to do so. Hauser was then, to judge from his appearance, 16 or 17 years old. Though short and broad shouldered, his figure was perfectly well-proportioned. His skin was very white; his limbs delicately formed, the hands and feet small and beautiful, the latter, however, showing no marks of his having ever worn shoes. With the exception of dry bread and water, he showed a violent dislike to all kinds of meat and drink. His language was confined to a few words or sentences in the old Bavarian dialect. He showed entire ignorance of the most ordinary objects, and great indifference to the conveniences and necessaries of life. Among his scanty articles of clothing was a handkerchief marked K. H.; he had likewise about him some written Catholic prayers. In the letter which he carried, dated, "From the confines of Bavaria, place unknown, 1828," the writer stated himself to be a poor day-laborer, the father of 10 children, and said that the boy had been deposited before his door by his mother, a person unknown to the writer. He stated further, that he had brought up the boy secretly, without allowing him to leave the house, but had instructed him in reading, writing, and the doctrines of Christianity; adding that it was the boy's wish to become a horse-soldier. The letter inclosed a line, apparently from the mother, stating that she, a poor girl, had given birth to the boy on the 30th April, 1812; that his name was Kaspar; and that his father, who had formerly served in the sixth regiment, was dead. Hauser was treated by the magistrates of Nuremberg as a destitute boy, and became the object of general sympathy. Binder, a burgomaster, exerted himself, in particular, to throw some light on the obscurity in which the origin of the young man was involved. In the course of many conversations with him, it came out that Hauser, from his childhood, had worn only a shirt and trousers; that he had lived in a dark place underground, where he was unable to stretch himself out at full length; that he had been fed upon bread and water by a man who did not show himself, but who cleaned and dressed him, and provided him with food and drink while he was in a state of natural or artificial sleep. His sole occupation was playing with two wooden horses. For some time before he was conveyed to Nuremberg, the man had come oftener to his dungeon, and had taught him to write by guiding his hand, and to lift his feet and walk. This narrative gave rise to various suppositions and rumors. Hauser was, according to some, the natural son of a priest, or of a young lady of high rank; while others believed him to be of princely origin, or the victim of some dark plot respecting an inheritance. Some incredulous persons believed the whole affair to be an imposition. On July 18, 1828, Hauser was handed over to the care of prof. Daumer. The history of his education is remarkable in a pedagogic point of view, as his original desire for knowledge, his extraordinary memory, and acute understanding decreased in proportion as the sphere of his knowledge extended. His progress was, on the whole, small. On Oct. 17, 1829, he was found bleeding from a slight wound on the brow, which he said had been inflicted by a man with a black head. All efforts made to discover the perpetrator were ineffectual. The incident excited a great sensation; Hauser was conveyed to the house of one of the magistrates, and constantly guarded by two soldiers. Among the many strangers who came to see Hauser was lord Stanhope, who became interested in him, and sent him, for the sake of his education, to Anspach. Here he was employed in an office of the court of appeal, but by no means distinguished himself for industry, and was gradually forgotten till his death again excited attention. A stranger, under the pretext of bringing him a message from lord Stanhope, and informing him of the circumstances of his birth, invited Hauser to meet him in the palace garden at three o'clock in the afternoon of Dec. 14, 1833, and stabbed him in the left side. Hauser had sufficient strength left to return home and relate the circumstances of his assassination, but died on Dec. 17, 1833. Compare Daumer, *Mittheilungen ueber Kasper Hauser* (2 vols. Nuremb. 1832); Feuerbach, *Kasper Hauser Beispiel Eines Verbrechens am Seelenleben* (Ansbach, 1832); *Allgemeine Zeitung*, June 3, 1875.

HAUSSMANN, GEORGES EUGÈNE, Baron; b. Paris, 1809; educated at the conservatory of music, and became an advocate. After the revolution of 1830 he was successively sous-préfet of Nerac, Saint-Girons, and Blaye, and under the presidency of Louis Napoleon, was préfet of Var, the Yonne, and Gironde. He was appointed préfet of the Seine in 1853, and under his direction Paris was almost rendered a new

city. Among his works were the improvement of the Bois de Boulogne, the prolongation of the Rue de Rivoli, the construction of the boulevard de Sebastopol, and of more than 20 boulevards in the old parts of Paris, various public gardens, squares, barracks, the halles centrales, the new prefectures of police, more than a dozen bridges, and the rebuilding of various mairies, in addition to numerous hospitals, asylums (especially the Hotel Dieu). After several loans had been contracted for the purpose of carrying out these improvements, the municipality of Paris, acting under the powers conferred upon them by special laws, raised a further sum of 250,000,000 francs in 1865, and 260,000,000 in 1869. On the formation of a parliamentary cabinet by M. Emile Olivier, Haussmann was asked to resign his office, and on his refusal was "relieved" by an imperial decree, dated Jan. 5, 1870. He received the decoration of grand officer of the legion of honor, 1856, and grand cross, 1862. In 1857 he was created a senator, and elected a member of the academy of fine arts. He was likewise a member of the imperial council of public instruction. After the fall of the empire he quitted France for a time. On his return he was appointed director of the Crédit Mobilier, and in this capacity he did much to restore the influence and improve the situation of that financial institution. At the election of Oct., 1877, he was returned to the chamber of deputies by the arrondissement of Ajaccio in Corsica, his candidature having received the official approbation of the government.

HAUT'BOIS, or O'BOE, a wind instrument of the "reed" genus. On account of its piercing sound, it was much used in military bands, in the middle of the 17th c., for playing the melody, and from it the whole band used in Germany to be called *Oboisten*. The hautbois, at an early date, took its place as one of the essential instruments of the orchestra. It is made of wood, generally of box, ebony, cocoa, or rosewood, and is constructed in three pieces, or joints, forming a continuous tapering tube, about 21 in. long, the bore of which is narrow at the small end, and widens into a bell-shaped opening, 1½ in. in diameter at the mouth. In the upper and middle piece there are holes, by stopping or opening which with the fingers, the player forms the notes of the natural scale, the intermediate semitones being formed by the keys. The reed is fixed upon the end of a small brass tube which fits, socket-wise, into the small end of the upper piece. The sound of the hautbois is rich; and from its great power in swelling or diminishing the sound, it is capable of every variety of expression. Originally, the hautbois had but two keys, but others have from time to time been added, till the number is now usually fifteen, and sometimes more. Its ordinary scale is that of C natural, but by means of the keys it can be played in every key with facility. Its range of available notes is from B to G in alt. Triebert of Paris is now the most celebrated maker.

Hautbois is also the name given by organ-builders to a reed stop of 8 ft. tone, which is made of metal, similar in shape to the real hautbois, and intended to imitate it in its sound. Its reed is made of thin brass. In all English organs it is an indispensable stop in the swell, where it is most effective. It is only a treble stop, of which the bass is the bassoon. In continental organs it is found of various scales, and when very fine is called the *oboe d'amour*.

HAUTE GARONNE, etc. See GARONNE, HAUTE, etc.

HAUTE-LOIRE. See LOIRE, HAUTE, *ante*.

HAUTE-MARNE. See MARNE, HAUTE.

HAUTE-PYRÉNÉES. See PYRÉNÉES, HAUTE, *ante*.

HAUTES-ALPES. See ALPES, *ante*.

HAUTE-SAÔNE. See SAÔNE, HAUTE, *ante*.

HAUTE-SAVOIE. See SAVOY, *ante*.

HAUTE-VIENNE. See VIENNE, HAUTE, *ante*.

HAUT-RHIN. See RHIN, HAUT, *ante*.

HAÜY, RENÉ JUST, a celebrated French mineralogist, was b. at St. Just, in Picardy, Feb. 28, 1743, studied for the church, and took priest's orders. His attention was turned at a comparatively early period of his life to botany, but it was not until he was 38 years of age that, in consequence of accidentally hearing Daubenton lecture on the subject in the jardin des plantes, he commenced the study of mineralogy. Linnæus had already shown that the regular form of crystals is due to the action of forces which obey definite laws, and Romé de Lisle had ascertained that the angles are constant in different crystals of the same variety; but the true laws of crystallization remained unknown until Haüy was led to their discovery by a fortunate accident. See his memoirs on crystallography and mineralogy, amounting to about 100, published between 1782 and 1821. (For their titles and dates, see Poggendorff's *Biog. Liter. Handwörterbuch*, pp. 1038 to 1040). His most important works are his *Traité de Mineralogie* (Paris, 1801, 4 vols. with atlas), of which a second edition appeared in 1822–23; *Traité Elementaire de Physique* (Paris, 1804, 2 vols.), of which a third edition appeared in 1821; *Traité des Charactères Physiques des Pierres Précieuses*, 1817; and *Traité de Crystallographie*, in 2 vols., with a volume of plates, in 1822. He was also a contributor to the *Encyclopédie Méthodique*, and the *Dictionnaire d'Hist. Nat.* Haüy's narrow escape

during the revolution has been already noticed in the memoir of Geoffroy Saint-Hilaire (q.v.). In 1793 he was appointed on the commission of weights and measures; in 1794, conservator of the cabinet des mines; in 1795, teacher of physics at the normal school; and finally, in 1802, he was appointed professor of mineralogy in the museum of natural history and in the faculty of sciences. He was an honorary canon of Nôtre-Dame, and is, in consequence, generally known as the abbé Haüy. He died in 1822, leaving no wealth beyond the collection on which he had based his great discoveries, and which is now preserved in the jardin des plantes.

HAÜY, VALENTIN, 1745–1822; b. France, a brother of René Just, the mineralogist. Valentin devoted great attention to the blind, for whose education he invented ingenious apparatus in the form of raised maps and letters. His first pupil was a blind beggar, who afterward himself became a teacher. In the first year of his school Haüy had 24 pupils. The school attracted general attention and prospered rapidly, many of its pupils becoming proficient in music and mathematics. In 1806 he was called to St. Petersburg by the emperor, and there founded a similar school; and about the same time promoted the establishment of a school in Berlin.

HAVA'NA, or, in English, *the harbor*, by far the most important city in the West Indies, is the capital of Cuba (q.v.). It stands on the n. shore of the island, in lat. 23° 8′ n., and long. 82° 23′ west. Pop. '71, 169,184, according to official return, but really at least 200,000. The climate is tropical, and almost uniform. In summer, the average maximum temperature is 87° F.; in winter, 85° F. The haven is one of the noblest in the world, and its comparatively narrow entrance is secured by six forts. Havana engrosses nearly the whole of the foreign trade of the colony, excepting, perhaps, the illicit importation of Africans, which requires more secluded localities; and it is connected by railroads and telegraph with places in the interior and on the s. coast. In 1877, 1669 vessels, of 835,065 tons, entered the port. Trade and industry have, however, been greatly checked by the insurrection which began in 1868 and lasted for ten years. Most of the mercantile nations have establishments here. Havana is famous for its cigars (164,533,000 cigars, besides 13,895,200 lbs. of tobacco were exported in 1875), and it has manufactures of chocolate, woolen fabrics, and straw-hats. Sugar is the chief export. Havana is a bishop's see, and the seat of government; and, in addition to a handsome display of religious and political establishments, has a university, a botanic garden, several theaters, and one of the most magnificent opera-houses in existence. The streets are in general narrow, but the promenade of *Isabel Segunde*, running through the center of the city, is very fine; it has a broad carriage-way, with shaded walks and several fountains, of which latter there are about 50 in the city.

HAVANA (*ante*). In 1873 the population of Havana had increased to 230,000, doubtless owing to the arrival of soldiers from Spain. A large and constantly growing commerce brings Havana into association with the leading commercial countries, American ships leading in number among the foreign arrivals. The chief manufacturing industry is that of tobacco, of which there was exported in 1878, 13,864,800 lbs., and 174,638,000 of cigars. Another important article of exportation is sugar, which with rum, molasses, fruits, etc., makes up a very valuable trade. Havana is noted for its thoroughfares and public parks—the pasco de Tacon, plaza de Armas, Alameda de Paula, and parque de Isabel—which are unequaled in any other city. The houses are low, with flat roofs, massively constructed, and of the general architecture common to southern Spain. Water is introduced into the city from a distance of 7 m., and there are more than 50 public fountains. Havana is a very unclean and a very noisy city. The sewerage is bad, and the arrangements for street cleaning are not effective. The number of public and private vehicles, apparently in constant use, is so great as to produce a turmoil and confusion which are not paralleled elsewhere. It is said that there are 6,000 victorias and innumerable volantes in the city, besides other vehicles, and the mode of driving is reckless and noisy.

HA'VEL, a river of the n. of Germany, and a considerable tributary of the Elbe, has its origin in a small lake a mile w. of the town of New Strelitz, in Mecklenburg. It flows southward from its source to Potsdam, and thence w. and n.w. to its junction with the Elbe, opposite the town of Werben. Its entire length is 218 m., and it is navigable to Furstenberg, a town within 30 m. of its source. The Havel, which throughout a considerable part of its course serves as the connecting link to a long chain of lakes, is of great importance to the internal trade of Prussia. Of its affluents, the Spree, which is longer than the Havel, is the only one worthy of mention.

HAVELOCK, Major-General Sir HENRY, K.C.B., was b. April 5, 1795, at Bishop-wearmouth, in Durham, where his father was a merchant and ship-builder. He entered the army a month or two after the battle of Waterloo, went to India in 1823, and honorably distinguished himself in the Afghan and Sikh wars. In 1856 he commanded a division of the army that invaded Persia. While absent in that country, news arrived of the Indian mutiny, and he hastened to Calcutta. He was directed to organize a small movable column at Allahabad, and to push on to the relief of the British at Cawnpore and Lucknow. He made a forced march to Futtehpûr, where, at the head of 2,000 men, he engaged and broke the rebels. He continued his march upon Cawnpore, and

twice defeated the enemy—first at Aeng, and then at the bridge over the Pandu Nuddi, 8 m. from Cawnpore. The consequence of the latter victory was the massacre of all the European women and children in the hands of Nana Sahib. Havelock had another battle to fight at Ahirwa, where the rebels were strongly intrenched. He turned their left, and the 78th Highlanders carried the village in a splendid charge. He now entered Cawnpore, and gazed with his men upon the mutilated bodies of the unhappy ladies and children. The sight steeled their hearts, and the avenging column quitted Cawnpore to advance upon Lucknow. Havelock crossed the Ganges, and repulsed the rebels at Unao, and afterwards on the same day at Busserut Gunge. After fighting eight battles with the rebels, in all which he was victorious, his little army found itself so thinned by fatigue and sickness, that he was obliged to retire upon Cawnpore. Early in Sept. gen. Outram arrived with reinforcements, and Havelock again advanced to the relief of Lucknow; Outram, with chivalrous generosity, refusing to take the command out of his hands. The relieving force, which mustered 2,500 men and 17 guns, routed the enemy at Mungalwar. It next engaged them at the Alum Bagh, an isolated building, about 3 m. from the residency of Lucknow. Havelock and his column, with desperate bravery, fought their way through streets of houses, each forming a separate fortress, until they gained the residency, to the indescribable joy of the beleaguered garrison. The victorious army were now in turn besieged, but held their own until Nov., when sir Colin Campbell (now lord Clyde) forced his way to their rescue. After the relief of Lucknow, Havelock was attacked by dysentery, and died Nov. 22, 1857. Before his death, news arrived of his elevation to the distinction of K.C.B. Other honors were in store for him, but they came too late. He was made maj.gen.; appointed to the colonelcy of the 3d foot; and received a baronetcy, with a proposed pension of £1000 a year. The rank and the pension were given to his widow, daughter of Dr. Marshman, an eminent minister among the Baptists. A new patent of baronetcy was issued in favor of the eldest son, Havelock having died the day before the patent was sealed. A metropolitan statue, raised by public subscription, has been erected to his memory in Trafalgar square. Havelock was a strictly religious man and a severe disciplinarian, somewhat after the type of the grave and gallant Puritans who fought and conquered under Cromwell. "For more than forty years," he said to sir James Outram in his last moments, "I have so ruled my life, that when death came, I might face it without fear." His death, at the moment when the rebellion had been crushed, excited the deepest sympathy and regret, not only in the army of India, but also among the public at home.

HAVEMEYER, WILLIAM F., 1804–74; b. New York; graduated at Columbia college, and was for many years a manufacturer of sugars. He was three times elected mayor of the city, and died while in office.

HAVEN, ALICE BRADLEY; 1828–63; b. New York; maiden name Emily Bradley. While at school she sent sketches to the Philadelphia *Saturday Gazette* signed "Alice G. Lee." In 1846 she married the editor of the *Gazette* (Joseph C. Neal), and wrote under the name of "Cousin Alice." After her husband's death, in 1847, she managed the paper for a number of years. In 1853 she was married to Samuel G. Haven. Among her publications are *The Gossips of Rivertown*, and a long list of books for the young such as *Helen Morton; No such Word as Fail; Out of Debt out of Danger*, etc.

HAVEN, ERASTUS OTIS, D.D., LL.D., b. Boston, 1820; graduated at Wesleyan university; was a teacher in Amenia seminary, and became an itinerant Methodist minister, laboring about six years in and near New York. In 1853 he was professor of Greek and Latin in Michigan university; in 1856, editor of *Zion's Herald*, Boston. He was twice in the Massachusetts senate, where he was an earnest advocate of educational interests; he was also a member of the state board of education. In 1863 he was chosen president of Michigan university; in 1869, president of the Northwestern university (Evanston, Ill.); in 1872 corresponding secretary of the Methodist Episcopal board of education; in 1874, chancellor of the university at Syracuse, N. Y. Among his works are *The Young Man Advised; Pillars of Truth, and Rhetoric; a Text book for Schools.*

HAVEN, GILBERT, 1821–80; b. Mass.; graduated at Wesleyan university; taught Greek and Latin in Amenia seminary for two years, and was chosen principal in 1848. In 1851 he joined the New England conference, and preached successively in several large towns. He was chaplain of a Massachusetts regiment in the war of the rebellion. In 1862 he traveled in Europe, and on return was two years a preacher in Boston. In 1867 he was the editor of *Zion's Herald*, holding the place until elected bishop in 1872. For some years he had manifested great interest in the welfare of the colored people, especially those in the southern states where (in Mississippi) he had supervision of relief for destitute freedmen. As bishop of the M. E. church, he was stationed at Atlanta, Geo., with special charge of the interests of the church in the adjoining southern states. He was an earnest advocate of Protestant missions among Italian and Spanish people, and in that interest made a trip to Mexico. Some of his publications are *The Pilgrim's Wallet; National Sermons;* and *Sermons, Speeches, and Letters on Slavery and its War.*

HAVEN, JOSEPH D.D., LL.D., 1816–74; b. Mass.; graduated at Amherst, and studied in Union theological seminary (N. Y.); graduated at Andover in 1839. After officiating

as pastor in Congregational churches in Brookline and Ashland, Mass., he was chosen professor of moral and mental philosophy in Amherst college; afterwards of systematic theology in the Chicago seminary. In 1870 he traveled in Europe and the east. In 1874 he was professor of mental and moral philosophy in Chicago university. He published *Mental Philosophy*, *Moral Philosophy* (text books), and *Studies in Philosophy and Theology*.

HAVENS. See HARBOR.

HAVER, a term used in Scotch law to denote the person in whose custody a document is. It often happens that in the course of a litigation it is essential for the court to see, or for one party to rely, on a document in the hands of a third party. In order to get at the haver or holder, letters of incident diligence are issued, which have the effect of compelling him to produce and exhibit the document, or state on oath why he refuses to do so. The term is not used in England, the same party being merely summoned as a witness by being told in his *subpœna* that he must bring the document with him; or, if there is no trial, he may be examined by commission or under interrogatories.

HAVERFORD COLLEGE, in Delaware co., Penn., was founded in 1832 by orthodox Friends. It was known at first as "Haverford school," but it was made a college, with power to confer degrees, about 1850. It possesses a farm of more than 100 acres of fertile land, and a shaded lawn of 60 acres, beautifully laid out. It has accommodations for only 60 resident students. It is in high repute for thoroughness in whatever it undertakes to teach, and especially for its watchfulness over the morals of its students. Since 1849 it has been open for other than the sons of Friends. Besides the main college building it has a commodious edifice known as "library and alumni hall." The library contains 10,000 volumes. The students are trained with great care and thoroughness, with special reference to the highest moral development. This is the first collegiate institution founded and conducted by Friends alone, and it has done much to raise the standard of intellectual culture among that eminently practical people. It is sectarian only in a very mild way, and has many strong attractions for students of other religious denominations. It has 5 instructors and 60 students. President, Thomas Chase, a graduate of Harvard.

HAVERFORDWEST (Welsh, *Hwlfordd*), a parliamentary and municipal borough, seaport, and market-town of Wales, capital of the co. of Pembroke, and a county of itself, occupies a highly picturesque situation on the sides and at the foot of several steep hills on the West Cleddau river, 8 m. n.e., of Milford, and about 270 m. w.n.w. of London. It is well built, but irregular, and is surrounded by several picturesque walks. When the Flemings settled in the district in the reign of Henry I., Haverfordwest was one of their principal stations. The castle, the keep of which is now used as the county jail, was erected by Gilbert de Clare, first earl of Pembroke, in the 14th century. The nave of St Mary's church—one of the finest in South Wales—is remarkable for the beauty of its roof-carving, and for its skillful construction and rich ornamentation. In conjunction with the boroughs of Fishguard, Narberth, and St Davids', Haverfordwest returns a member to parliament. The trade of the town is inconsidera'ble. Pop. '71, 6,622.

HAVERHILL, a city in Massachusetts, U. S., at the head of navigation of the Merrimack river, on its north bank, 12 m. from its mouth, and 32 m. n. of Boston. It is a pretty town, connected by two bridges with Bradford, and the seat of an active manufacturing industry in boots and shoes (in which 800 persons are engaged), iron, woolens, hats and caps, railway carriages, coaches, soap and candles, tinware, leather. In the colonial times, it was a frontier town, and suffered much from the Indians. Pop. '70, 13,092.

HAVERHILL (*ante*), a handsome city in Essex co., Mass., built on hills sloping down to the Merrimack river. The chief business is shoe manufacturing in which no town exceeds it except Lynn. There are about 7,000 persons engaged in the trade. There are 19 churches, 5 newspapers, a masonic temple, and a public library (20,000 vols.) in a fine building including a hall of statuary. The city hall is also a fine edifice. Haverhill is the birthplace of the poet Whittier. It was settled in 1641. In 1698 the Indians made an assault on the place, capturing Mrs. Hannah Dustan with her child (six days old) and nurse. The child they killed, and after a long march through the woods towards Canada came near one of their villages. They told the women that they would be compelled to run the gauntlet for the amusement of the Indians; but that night Mrs. Dustan, the nurse, and a young English boy (who was also a captive) silently arose, killed ten of the twelve Indians, scalped them, and in a bark canoe went down a river safely reaching home. In 1708 the French and Indians attacked Haverhill and killed or captured 40 persons.

HAVERS, CLOPTON, M.D., an eminent anatomist and physician, who, after studying at Cambridge and Utrecht, where he graduated, settled in London in 1687. His *Osteologia Nova, or Some New Observations of the Bones and the Parts belonging to them* (8vo, Lond. 1691), was long a standard work, and his name is indelibly recorded in the annals of anatomy as the discoverer of the Haversian canals in bone. He edited *The Anatomy of Man and Woman from Spacher and Remmelin* (folio, Lond. 1691), and was

a contributor to the *Philosophical Transactions*. The exact date of his death is not known.

HAV'ERSACK, a bag of strong coarse linen, in which, on a march, each soldier carries his own bread and provisions. It is borne on the left side by a strap passing over the right shoulder, and is only used in the field and in cantonments.

HAVERSIAN CANALS. See BONE.

HAVERSTRAW, a t. in New York, U. S., situated on the w. bank of the Hudson river, 37 m. n. of New York city. Stony Point, famous in the history of the American revolution, lies in this township. Steam-boats and sloops carry on an active trade with New York, and there are several foundries and manufactures. Pop. of township '70, 6,412.

HAVIL'DAR, the highest rank of non-commissioned officer among native troops in India and Ceylon. In the Hong-kong Gun Lascars (a corps now disbanded), the havildar received 1s. 3d. per diem; but in India his pay is somewhat less.

HAVRE, LE (a contraction of the original name, LE HAVRE DE NOTRE DAME DE GRACE), the second town in the department of Seine-Inférieure, France, and next to Marseille, the chief commercial emporium of that country, is situated on the n. side of the estuary of the Seine, in lat. 49° 29′ 16″ n., long. 0° 6′ 37″ e., and 108 m. n.w. of Paris, reckoning in a straight line. Havre has direct communication with Great Britain, Holland, Hamburg, Portugal, Mexico, Brazil, United States, India, etc. It is the port of Paris, with which it is connected by a railway 134 m. long, and the continuation of this line to Strasburg affords such facility of communication with Germany, that the greater part of the trade of that country with America is carried on through Havre. For foreign trade, Havre is the Liverpool of France; it receives annually from 500,000 to 600,000 bales of cotton, nearly three-fourths of the whole quantity imported; it also ships most of the exports to America, and generally speaking, possesses about one-fifth of the whole trade of the country. The sum-total of its imports and exports is about 2,000,000,000 francs (£80,000,000). Customs receipts in 1874, £827,300. The imports consist of cotton, spices, coffee, tea, sugar, timber, coal, etc.; and the exports of French manufactured goods, of wine, brandy, oil, jewelry, provisions, etc. In 1877, 5,925 vessels, of 1,854,202 tons, entered the port—a considerable falling off as compared with previous years. About 500 vessels belong to Havre. Havre also possesses manufactories of paper, sulphuric acid, tobacco, cotton goods, starch, lace, oil, machinery, ropes, salt, etc., also sugar refineries; the annual value of the manufactures being estimated at £2,500,000. Its harbor is one of the most accessible in France, and is entered by a narrow channel formed by two long jetties stretching from e. to w., and which, owing to the current, requires little dredging. This channel leads to the *avant port* (outer harbor), where the various passenger-steamers lie, and within this avant-port are capacious wet docks, capable of accommodating 500 ships. The largest of these is L'Eure, which contains 700,000 square feet. Among the dry docks, one recently completed, 515 feet long and 112 broad, is a stupendous work, and obviates the necessity for sending large steamers for repairs to Southampton. A new basin has been constructed in the plain of the Leure, measuring about 53 acres. Havre was, till lately, surrounded by ramparts and lofty walls; but these were demolished, to admit of the extension of the town, which has now absorbed the neighboring communes of Ingouville and Graville l'Heure, and numbers, '76, 85,407 inhabitants. Among the public buildings may be noticed the churches of Notre Dame and St Francis, the new City hall (built in the style of the Tuileries), the tower of Francis I., exchange, mansion-house, arsenal, barracks, and a number of elegant villas which clothe the slopes of Ingouville. The principal institutions are a royal school of navigation, a school of applied geometry, and a library containing 20,000 vols. The greater part of the town is modern. Havre was founded in 1509 by Louis XII., on the site of a fishing village, and was intended as a harbor of refuge for the French navy. It was greatly extended and improved by his successor, Francis I., and from his time rapidly rose in importance, especially as the rival harbor of Harfleur was being gradually silted up with sand. The names of Richelieu, Colbert, Vauban, Napoleon, etc., are connected with the improvements and additions made to the original harbor. It was bombarded by the British in 1694, 1759, 1794, and 1795. Under Louis XIV., it became the entrepôt and chief seat of operations of the French East India and the Senegal and Guinea Companies. It is celebrated as the birthplace of Mademoiselle Scudery, Bernardin St Pierre (author of *Paul and Virginia*), and Casimir Delavigne. The statues of the last two are placed in front of the library facing the harbor.

HAVRE DE GRACE, a village at the n. extremity of Chesapeake bay, in Harford co., Maryland; on the Philadelphia, Wilmington and Baltimore railroad and at the mouth of Susquehanna river, 36 m. e.n.e. of Baltimore; pop. 3,000. There is a railroad bridge across the river more than 1000 yards long. There are several churches, one newspaper, a high school, and a number of manufactories. The village was burned by the English in the war of 1812.

HAWAI'I. See SANDWICH ISLANDS.

HAWARDEN, a t. in Wales, in Flintshire, 8 m. s.w. of Chester; situated on an eminence commanding an extensive prospect. It lies in the midst of a coal district, and near it are valuable clay-beds. The most important business is the manufacture of coarse earthenware, draining tiles, and fire-clay bricks. The family of Maude derive the title of viscount from the town. Pop. '71 of the township, 6,782; of the parish, (including Saltney), 8,683. In the neighborhood is Hawarden castle, built in 1752, and added to and altered in the Gothic style in 1814; it stands near the ruins of the old castle of that name which was granted by the conqueror to his nephew Hugh Lupus, which after many vicissitudes came into the possession of sergeant Glynne, lord chief-justice of England under Cromwell. On the death in 1784 of sir Stephen R. Glynn, the last of a line of baronets, the castle passed to his brother-in-law, the eminent statesman, Mr. W. E. Gladstone.

HA'WASA, or, more properly, AUSSA, formerly an important, but now a decayed t. of eastern Africa, capital of the country of Adal (q.v.), is situated on the Hawash, in lat. 11° 30′ n., and long. 41° 45′ east. It is still the seat of some traffic, a perpetual fair or market being held here, at which salt, blue calico cloth, and the produce of the soil, are said to be the chief articles of sale. About Hawasa, however, little has yet been ascertained. Pop. estimated at between 5,000 and 6,000.

HA'WASH, a considerable river of Abyssinia, has its origin near the south-western border of the Shoa territory, in lat. about 90° n., and long. about 38° east. It flows in a general n.e. direction, forming throughout three-fourths of its course the southern and eastern boundary of Shoa, and separating that country from the districts inhabited by the Gallas tribes. It then flows through the territories of the Mudaito tribes, and falls into lake Aussa, in lat. 11° 35′ n., and long. 41° 50′ east. The name of the country of Abyssinia (called Habesh by the Arabs) probably originated in that of the river.

HAWES, JOEL, D.D., 1789–1867; b. Mass.; graduated at Brown university, and studied theology at Andover. In 1818 he became pastor of the first Congregational church in Hartford, Conn. Among his published works are: *Lectures to Young Men; Character Everything to the Young; The Religion of the East; Looking-glass for Ladies, or the Formation and Excellence of Female Character,* etc.

HAWFINCH, *Coccothraustes vulgaris,* a bird of the grossbeak (q.v.) genus, and the finch family (*fringillidæ*). It is considerably larger than the chaffinch; the adult male has the crown and back chestnut brown, the neck and rump gray, the wings partly black, the larger wing-coverts white. The Hawfinch is a very shy bird, avoiding man, and therefore often unobserved in districts where it is by no means rare. It is gregarious. It lives chiefly in forests, builds its nest on the highest branches of trees, and feeds very much on beechmast and the kernels of the haw, plum, cherry, etc. It is not uncommon in some parts of England, but is rare in Scotland. It is widely diffused over Europe and the temperate parts of Asia.

HA'WICK, a burgh of barony, and a considerable manufacturing t. in the s. of Scotland, in the co. of Roxburgh, is situated at the confluence of the Teviot and the Slitrig, 10 m. s.w. of Jedburgh, and 53 m. s.e. of Edinburgh by railway. Some of the churches and bank-offices are elegant modern buildings; many elegant mansions and fine villas have sprung up within recent years; and several new streets are models of neatness. The town contains several relics of antiquity worthy of mention. Among these are the Tower inn, part of which was an ancient fortress, and the residence of the barons of Drumlanrig, the superiors of the town; and the Moat, a circular mound, supposed to have been used in remote times both as the place of assembly and deliberation of the neighboring chiefs, and as the seat of the administration of justice. Hawick carries on the manufacture of tweeds (q.v.) on an extensive scale, and has long been known as a principal seat of the hosiery manufacture in Scotland. The tweed-trade has greatly increased in importance of late years, and besides the manufacturers, resident wholesale merchants are largely engaged in it. The stocking manufacture was commenced in 1780. Plaids, shawls, blankets, and leather are also manufactured in the town. About 300 power and 100 hand looms are employed. The exchange is a large and handsome building erected in 1865, in which year the formerly defective water-supply was made excellent by the introduction of the Allen, a mountain burn, which joins the Teviot 5 m. above the town. The ancient municipal constitution of the burgh, founded on a charter granted by James Douglas of Drumlanrig, and confirmed by queen Mary, was reformed by special act of parliament in 1861. The corporation now consists of 15 councilors, elected by £4 householders. The council elect a provost and 4 bailies from their number, as in royal burghs. Hawick now forms one of the 8 border burghs, which together return a member to parliament. Pop. '71, 11,355.

HAWI'ZA, a large and provincial Arab t. of Persia, in the province of Khuzistan, is situated in lat. 31° 15′ n., and long 48° e., 80 m. s.w. of the city of Shuster. Previous to 1835, the river Kerkhah flowed through the town from e. to w.; but a canal having been made to irrigate a tract of the country on the n. side of the river, and whose level was lower than that of the vicinity, the waters of the river burst through the new opening, and are now lost in a marsh, 15 m. n. of Hawiza. The inhabitants of the town can

now obtain water only by digging wells in the old bed of the river. Pop. estimated at 12,000.

HAWK, a term often applied to almost all the *falconidæ*, except the largest eagles, but also used in a more restricted sense to designate a section of the family, reckoned among the *ignoble* birds of prey, having the wings so short as not to extend to the extremity of the tail, and the bill short and curving from the base. In many of their characters and habits, however, they make a very near approach to the true falcons. The species are numerous, are arranged in several genera, and are distributed over the world. Examples of two of the most important genera are the goshawk (q.v.) and sparrowhawk (q.v.) of Britain.

THE HAWK frequently occurs as a charge in heraldry, and may be *belled*, *jessed*, and *varveled*. The *hawk's bell*, itself used as a separate charge, is attached to the leg of the bird by *jesses* or thongs of leather. *Varvels* are rings attached to the end of the jesses. The *hawk's lure*, also a heraldic charge, consists of two wings joined with the line, to the end of which is attached a ring. The line is sometimes *noued* or knotted.

HAWKBIT, the fall dandelion, a perrennial plant of Europe, grown in some parts of the United States. It bears yellow flowers resembling dandelions, and is plentiful from July to Oct. in the eastern states.

HAWKE, EDWARD, Baron, 1705–81; an English admiral. In the naval engagement at Toulon in 1744 he broke from the line of battle in order to engage the *Poder*, and succeeded in compelling her to strike her colors; but his breach of discipline was punished by dismissal from the service. He was, however, restored by the king, and in 1747 was promoted to the rank of rear-admiral of the white. In Oct. of the same year he commanded a squadron sent to intercept a fleet of French merchant vessels bound for the West Indies under a convoy of nine men-of-war, and coming up with them on the 14th near the isle of Aix, he succeeded in capturing six of the men-of-war, but darkness coming on before the close of the contest, all the merchant vessels escaped. For his victory he was created a knight companion of the Bath. In Dec. of the same year he was chosen member of parliament for Bristol. In May, 1748, he became vice-admiral of the blue, and in Jan., 1755, admiral of the white. In 1756 he succeeded admiral Byng as commander of the fleet in the Mediterranean. In 1759 he took charge of a squadron sent to cruise off Brest. On the morning of Nov. 20 he sighted the French fleet under admiral Conflans, off Belleisle, and notwithstanding that the French, trusting to their knowledge of the rocks and shallows, retired towards the shore, he engaged them with such impetuosity that their fleet was only saved from total destruction by the approach of night. As it was, more than half of their vessels were either disabled, captured, or driven on shore. For this brilliant victory, gained with the loss of only two vessels, Hawke received the thanks of the house of commons, and a pension of £2,000 per annum. In 1765 he was appointed vice-admiral of Great Britain, and first lord of the admiralty. In 1776 he was raised to the peerage by the title of baron Hawke of Towton.

HAWKERS, or PEDDLERS, or PETTY CHAPMEN, persons who go from town to town, or door to door, selling goods, wares, or merchandise, or exercising their skill in handicraft. A considerable change has been made by recent legislation in regard to this class. Those peddlers exercising their calling entirely on foot have been separately dealt with from hawkers who employ one or more beasts of burden in their business. The foot peddlers are placed under the surveillance of the police, and are exempt from excise duty. Since Jan. 1, 1872, any person whatever who can satisfy the chief officer of police of the police district in which he resides, that he is of good character, is above seventeen years of age, and has resided during the previous month in the district, will receive, on due application, a certificate valid for a year, on payment of five shillings. Such certificate entitles the holder to exercise his calling in the particular police district only; but should he desire to extend his traffic to another police district, he can, by satisfying the chief officer of that district of his good character, receive an indorsation on his certificate, rendering it valid for that particular district also, on payment of six pence. The police have power at any time to open and search the packs, etc., of any certificated peddler, with a view to prevent dishonesty and smuggling, etc., for which they have much opportunity. They have an appeal to the local justice of peace and other courts against oppression by the police.

Hawkers or peddlers who use beasts of burden are in a different category. Any person may become such by merely taking out an annual or half-yearly license from the excise, and there is no limit of the locality, the license being valid all over the kingdom. These licenses are at the rate of £4 per annum for each beast of burden used in the trade. He is in no case entitled to sell spirits, but he may sell tea and coffee. He must not sell plated goods without taking out a plate license, nor must he sell by auction without an auctioneer's license. Any person hawking unprovided with a license, or who refuses to produce the license to any person who calls for it, is liable to severe penalties. Commercial travelers, book agents, sellers of vegetables, fruit, fish, or victuals, also sellers in fairs or markets legally established, do not require either licenses or certificates, though it must be sometimes difficult to define whether a seller comes within the category of a peddler or hawker (34 and 35 Vict. c. 96; 29 and 30 Vict. c. 64).

The reason why the state imposes this tax on hawkers is, that they have great advantages over regular shopkeepers, as they pay no rent, and often interfere with the natural course of dealing at shops.

HAWKESBURY, a river of New South Wales, in e. Australia, enters the Pacific at Broken bay, about 20 m. to the n. of Sydney. Its entire course does not exceed 50 m., the dividing ridge of mountains being here very near to the coast. Pitt Town, Wilberforce, and Windsor are situated on its banks, and it is navigable from the sea to four m. above the last-mentioned place. The Hawkesbury, even in this land of floods, is remarkable for its inundations. In 1808 the water rose 86 ft.; and in 1844 it rose 20 ft. in a few hours.

HAWKESWORTH, JOHN, 1715–73; b. London. He is said to have been apprenticed at first to a clockmaker and afterwards to an attorney. In 1744 he succeeded Dr. Johnson as compiler of the parliamentary debates for the *Gentleman's Magazine*. Eight years later he started in company with Johnson, Bathurst, and Warton a periodical called the *Adventurer*. This journal had a great success, and ran to 140 numbers, of which 70 were from the pen of Hawkesworth himself. In 1761 he published a volume of fairy tales, and an edition of Swift's works and letters, with a life prefixed which Johnson referred to in highly laudatory terms in his *Lives of the Poets*. He edited the papers of capt. Cook relative to his first voyage, published in 1773 in three volumes, and as a reward of his labors Hawkesworth received from the government the sum of £6,000. His descriptions of the manners and customs of the new world were, however, regarded by many critics as hurtful to the interests of morality, and the severity of their strictures is said to have hastened his death.

HAWKING. See FALCONRY, *ante*.

HAWKINS, a co. in e. Tennessee on the Virginia border, intersected by Holston river, and reached by the East Tennessee and Virginia railroad; 440 sq.m.; pop. '70, 15,837—1889 colored. Clinch mountain and other ridges are prominent features. Chief productions: corn, oats, and butter. Co. seat, Rogersville.

HAWKINS, BENJAMIN WATERHOUSE, b. London 1807; an artist excelling in painting animals. He lived at Knowsley, the seat of the late earl of Derby (at the earl's invitation) where for five years he studied animal portraiture. He was assistant superintendent of the international exhibition of 1851, and in 1852, the crystal palace company employed him to make restorations of extinct animals, in which art he was an expert. In 1868 he lectured in New York and other cities of the United States, and afterwards resided in this country. Here he was employed by the central park commissioners of New York, in restoring the forms of extinct creatures, but later administrations rejected his work, much of which was destroyed. Some specimens, however, exist in the Smithsonian institution collection. He has written *Elements of Form, Comparative View of the Human and Animal Frame, Popular Comparative Anatomy*, etc.

HAWKINS, Sir JOHN, an English navigator, was b. at Plymouth about 1520. He has the infamous distinction of being the first Englishman that trafficked in slaves. His "commercial" career ended in 1568, after which we find him more honorably employed. He was appointed treasurer of the navy in 1573, knighted for his services against the Spanish Armada in 1588, and for the rest of his life was engaged in making havoc of the Spanish West Indian trade. In 1595, along with his kinsman, Drake, he commanded an expedition directed against the Spanish settlements in that part of the world, but died, Nov. 21, in the same year. Hawkins founded a hospital at Chatham for the relief of disabled and sick sailors.

HAWKINS, Sir JOHN, 1719–89; b. England; destined for an architect, but took to the law, devoting his leisure hours to his favorite study of music. A wealthy marriage in 1753 enabled him to indulge his passion for acquiring rare works of music, and he bought the collection formed by Dr. Pepusit, and subsequently presented by Hawkins to the British museum. It was on such materials that Hawkins founded his celebrated work on the *General History of the Science and Practice of Music* (1776), which is less a systematic treatise than a collection of rare and valuable pieces of music with a more or less continuous commentary. He also made occasional contributions to the *Gentleman's Magazine*, edited the *Complete Angler*, and wrote a biography of Dr. Johnson, with whom he was intimately acquainted. He was one of the original members of the Ivy Lane club, and ultimately became one of Dr. Johnson's executors.

HAWK-MOTH, a name sometimes used to comprise all the lepidopterous insects of the section *crepuscularia*, the Linnæan genus *sphinx*. They have a spine or stiff bristle on the anterior edge of each of the hind-wings, and these being received in corresponding hooks on the under-side of the forewings, attach them together. Their wings are generally covered with a looser down than those of butterflies. The body is rather large and thick. Notwithstanding the name *crepuscularia*, signifying that their period of activity is that of twilight, and which is truly characteristic of the greater number, many of them may be seen darting from flower to flower even at mid-day, or hovering over flowers, from which they suck the honey by their long proboscis. They make a loud humming noise with their wings, and are insects of very rapid and powerful flight. Their caterpillars have always 16 feet. A peculiar position which the caterpillars often

assume has led to the name *sphinx*, because of a fancied resemblance to the sculptured monster of Egypt. Their chrysalids are cylindrical, free from points and angular prominences, blunt-headed, with a conical abdomen, and are sometimes inclosed in cocoons, sometimes concealed in the earth.—The name hawk-moth is sometimes limited to a division of the *crepuscularia*, of which the genus *sphinx*, as now restricted, is the type, and of which the death's head moth (q.v.) is an example. Their caterpillars are smooth and elongated. The name hawk-moth appears to be derived from the hovering motions of these insects, resembling those of hawks looking for prey.—Many hawk-moths are natives of Britain; they are more abundant in warmer climates. Some of the species have a wide geographical range.

HAWKS, Francis Lister, D.D., LL.D., American clergyman and author, was b. at Newbern, N. C., June 10, 1798; educated at the university of North Carolina; admitted to the bar in 1817; in 1819, elected to the state legislature; but being drawn to the church, he was ordained, in 1827, a clergyman of the Episcopal church, and was engaged at New Haven, Philadelphia, and St. Thomas's church in New York, until 1843. During this period he was appointed historiographer of the Episcopal church in America, and visited England in search of documents. In 1837 he founded, with Dr. Henry, the *New York Review*, and established St. Thomas's hall, a high school, at Flushing, Long island, which involved him in heavy pecuniary liabilities, charges based upon which were brought against him on his election in 1843 as bishop of Mississippi. He was acquitted of the charges brought against him, but declined the bishopric. In 1844 he became rector of Christ's church, in New Orleans, and president of the university of Louisiana. In 1849 he declined the bishopric of Rhode Island, and became rector of Calvary church, New York. In this busy career he published *Reports of the Supreme Court of North Carolina* (4 vols., 1823–28); *Contributions to the Ecclesiastical History of the United States* (2 vols., 1836–40); *Egypt and its Monuments* (1849); *Auricular Confession in the Protestant Episcopal Church* (1850); a translation of Rovero and Tschudi's *Antiquities of Peru* (1854); and edited the papers of gen. Alexander Hamilton; biographical works; several juvenile books; *Commodore Perry's Expedition to the China Seas and Japan in* 1852–54; and a portion of a *History of North Carolina*. He died in New York, Sept. 27, 1866.

HAWKSBEE, or **HAUKSBEE,** Francis, a natural philosopher of considerable eminence, was b. in the latter half of the 17th c., and died about 1730. He was admitted a fellow of the royal society in 1705, and was appointed to the office of curator of experiments to the society, and in 1723 he was elected assistant-secretary. He contributed 43 memoirs to the *Philosophical Transactions*, chiefly on chemistry and electricity. Of his experiments in the latter department, Dr. Thomson, the historian of the royal society, observes, that "they constitute the beginning of the science, and by drawing the attention of philosophers to that particular subject, were doubtless of considerable service in promoting electrical investigations." All these memoirs appeared between the years 1704 and 1713. His chief independent work was published in 1709, and was entitled *Physico-Mechanical Experiments on various Subjects; touching Light and Electricity producible on the Attrition of Bodies.* He is perhaps best known for his improvement of the earlier air-pumps of Boyle, Papin, and Hooke (a subject fully discussed in Wilson's *Religio Chemici*, pp. 215–218), and for being the first who used glass in the electrical machine.

HAWKSHAW, John, b. England, 1811, and educated there; afterwards turned his attention to engineering. At the age of 20 he was sent out to superintend certain copper mines in South America. He returned to England in 1834, and had charge of important railway and other engineering works; was one of the London commission of sewers, and president of the institution of civil engineers. In 1870 he proposed a submarine tunnel under the straits of Dover. He was knighted in 1873, and president of the British association in 1875. He has published *Reminiscences of South America*, and papers on engineering. Besides his labors in England, Hawkshaw became connected with some of the most important engineering works of Europe, including railroads in Russia, a ship-canal connecting Amsterdam with the North sea, the Madras and Eastern Bengal railway, the government railways in Mauritius, etc.

HAWKWEED, *Hieracium*, a genus of plants of the natural order *compositæ*, sub-order *cichoraceæ*. The species are annual, or more generally perennial plants, some with leafless scapes, one-flowered or many-flowered, and some with leafy stems; the leaves, stems, and involucres in many species being hairy. They are very numerous, natives of the temperate and colder regions of the northern hemisphere, particularly abounding in Europe. A number are natives of Britain, and some of them are very common plants. The flowers are generally yellow, but the orange hawkweed (*H. aurantiacum*), a native of the s. of Europe, and doubtful native of Britain, is often cultivated in gardens for its rich orange flowers. It is a perennial, about 2 ft. high.

HAWLEY, Gideon, 1727–1807; b. Conn.; graduated at Yale, and began missionary work among the Indians at Stockbridge in 1752. Two years later he undertook a mission among the Iroquois on the Susquehanna river, but was driven out in 1756 by the French and Indian war. The latter part of his life was passed in missionary duties in Marshpee, Mass.

HAWLEY, JOSEPH, 1724–88; b. Mass.; graduate at Yale in 1742. He began to preach, but gave up the pulpit for the practice of the law, and became a leading advocate. He was in the house of representatives from 1764 to 1776, and took a prominent position as a friend of freedom from Great Britain. In religious matters he was at first a firm opponent of the theories taught by Jonathan Edwards, but late in life he became their equally firm supporter.

HAWLEY, JOSEPH ROSWELL, b. N. C., 1826, of Connecticut parents, who 11 years after returned to that state. He graduated at Hamilton college, studied law, and began practice in Hartford. In 1857 he became the editor of the *Evening Press*, a newly established republican newspaper. He soon became prominent as a republican writer and speaker. When the rebellion began, he was the first citizen of his state to volunteer on the union side. He entered the service as capt., and was with his company in the battle of Bull Run. He served in various battles, and throughout the war, and was mustered out as brevet-maj.gen. In 1866 he was chosen governor of his state, and when he retired he returned to editorial work on the Hartford *Courant* with which the *Press* had been consolidated. Hawley was president of the republican national convention at Chicago in 1868. In 1872 he was chosen member of congress, and was re-elected in 1873. In 1876 he was president of the centennial commission, and was largely instrumental in elaborating and organizing the system of management of the international exhibition at Philadelphia.

HAWSE, the situation of the cables in front of a ship's bow, when she is moored with two anchors out forward—one on the starboard, the other on the port bow. The term is also used to denote any small distance ahead of a ship, or between her bow and the anchors at which she rides; as, for instance, when it is said of another vessel "she sailed athwart our hawse," or, "she anchors in our hawse." When the two cables pass directly to their anchors, without crossing or chafing at the *hawse-holes* by which they enter the ship, the vessel is said to have a "clean hawse."

HAWSER. See ROPE.

HAWTHORN, *Cratægus oxyacantha* (see CRATÆGUS), a shrub or small tree, a native of Europe, Siberia, and the n. of Africa, common in Britain, and much planted both for hedges and for ornament. It varies in height from 6 or 8 to 20 or 25 feet. It has roundish obovate 3 to 5-lobed deciduous leaves, and corymbs, generally of white, rose-colored, or sometimes deep crimson flowers, succeeded by a small red fruit (*haws*) with yellow pulp, the central stony part bearing a very large proportion to the pulp. The fruit remains on the tree after the leaves have fallen, and affords winter-food to birds. There are many varieties of hawthorn, and, curiously enough, some have only one style, whilst some have several. The variety called GLASTONBURY THORN—because supposed to have originated at Glastonbury abbey—is remarkable for its early flowering, which often takes place in the middle of winter, whilst the common kind is not in flower till May or June. The winter flowers of the Glastonbury variety are, however, not generally followed by fruit, and a second flowering often takes place in the same year. The common hawthorn is often popularly called *May*, from the season of its flowering in England. It is also called *whitethorn*, in contradistinction to the sloe or blackthorn. The use of the hawthorn for hedges is almost universal in Britain. It is also sometimes employed as a stock on which to graft apples and other *pomaceæ*. It attains a great age, and in its more advanced stages, is a tree of slow growth, although, when young, it shoots up rapidly. The wood is very hard, close-grained, and takes a a fine polish, but is apt to warp. A fermented liquor, which is very intoxicating, is made from the fruit in many parts of France.

The hawthorn is particularly valuable as a hedge-plant, in consequence of its strong and plentiful spines, its long life, and its ready adaptation to very various soils. For this purpose, it is propagated by seed; the haws are laid in a heap to rot, with a mixture of sand or fine mold, and in a year or sixteen months after, the seeds are sown in ground carefully prepared by digging and manuring with well rotted manure. The seed-drills are about 16 in. apart. The young plants are kept clear of weeds, and the earth about them occasionally stirred with the hoe. They often grow to the height of a foot or 2 ft. in the first season. They are commonly once transplanted before their final planting to form hedges. See HEDGE. Hawthorn hedges bear trimming very well, and the natural disposition of the plant to spread out above, can be counteracted, so as to make the hedge as it ought to be, widest at bottom; but unless the soil is very favorable, some of the plants are apt to die, and form gaps, which it is by no means easy to fill up with fresh plants.—Young hawthorn plants are called *quicks* or *quicksets*, because used to make living (*quick*) fences.

HAWTHORNE, JULIAN, b. Boston, 1846; son of Nathaniel. He was in Europe from 1853 to 1860. In 1863 he was a pupil in Harvard college, but did not graduate. In 1868 he went to Germany to study engineering, and in 1870–72 he was employed as an engineer by the dock department of New York. In 1872 he made his permanent residence in Dresden, Germany. He has displayed much force and originality as a novelist, publishing *Bressant*, *Idolatry*, *Garth*, and many light sketches.

HAWTHORNE, NATHANIEL, an American author of distinction, was b. at Salem in the state of Massachusetts, on July 4, 1804. He was educated at Bowdoin college, and after graduating there, he obtained a post in the custom-house at Boston, which he soon, however, threw up, and betook himself to literary work for a subsistence. He wrote a number of stories for the journals, which he afterwards collected in 1837, and published under the title of *Twice-told Tales;* a second volume of which appeared in 1851. In 1843 he took up his residence at the charming village of Concord, in a manse which had formerly been the dwelling of Emerson, and which suggested the title of his next work, *Mosses from an Old Manse* (Boston, 1846). This sketch, in which he gives some interesting recollections of his boyhood, first made his name known in Europe. In 1842 he published *The Liberty Tree;* and in 1845, *The Journal of an African Cruiser*. After a three years' residence at Concord, he again accepted a situation in the custom-house at Boston, and removed to that town. This, however, did not stop his literary work. *The Scarlet Letter* appeared in 1851, and was received with universal approbation, as was likewise *The House of the Seven Gables*, published in the same year; and their author was at once recognized, both in Europe and America, as a man possessing a true poetic spirit, combining fine feeling with a charming style, and displaying a deep knowledge of human nature accompanied by genuine humor. His *Blithedale Romance* (Boston, 1852) may be regarded as a kind of autobiography, so far as it goes, being founded on passages in his own life. In 1853 he received the appointment of consul at Liverpool, from his friend, president Pierce, who had been a fellow-student of his, and whose life he had written (*Life of Franklin Pierce*, Boston, 1852). He resided in Liverpool discharging the duties of his office for four years, and afterwards went to Italy to recruit his impaired health; a journey which furnished him with material for his fantastic romance, *Transformation* (London, 1860), which is regarded by some as the best of his works. After his return to America he published *Our Old Home* (1863), a sketch of England and the English. He died suddenly at Plymouth in Massachusetts, May 19, 1864. After his death appeared *Septimius, a Romance of Immortality; American Note-Books; English Note-Books;* and *French and Italian Note-Books* (1872).

HAXO, FRANÇOIS BENOÎT; baron, 1774–1838; b. France; gen. of engineers. He was concerned in a number of sieges, and constructed many important fortifications. The "Haxo casemate" is a work built inside the parapet, arched, and covered with earth, opening in the rear to the terreplain. The guns are protected from the enemy's fire, and can be entirely hidden by masking the embrasures.

HAY (Ger. *heu*, Dutch, *hoy;* probably from the root of Ger. *hauen;* Eng. *hew*, to cut), the stems and leaves of grasses or other plants dried for fodder (q.v.) of cattle. Throughout the grazing and dairy districts of England, and especially in the vicinity of large towns, the hay-harvest is as important as the corn-harvest, and a large breadth of old pasture is annually cut. In Scotland, however, little of this old natural grass is converted into hay, and the crop consists mainly of clover and rye-grass. This requires less turning and labor than the closer succulent natural grass, and with twice turning, and a week or ten days' drying, will generally be fit for the rick, into which the English farmer at once places it. In Scotland the weather is seldom sufficiently fine to fit the hay, within a moderate time, for a large rick, and the practice is to put it, after a few days, in cocks, containing one or two hundredweight, and thence, after another week, into what are technically called tramp-ricks, containing from one to two tons. From these it is transferred at any convenient time to the rick-yard. This practice, although almost universal in the north, is attended with loss of time and labor, and, moreover, bleaches and dries up the hay, giving it the appearance of straw, and preventing that gentle heating which English farmers desire both in their clover and grass hay.

The management of the natural grasses of which most English hay consists is somewhat different, and the process is seen in perfection in Middlesex and various of the counties about London. The great matter—too generally overlooked in Scotland—is to preserve the color and flavor of the grass; and this can only be done by keeping it constantly turned, and having it rapidly dried, if possible, without the deteriorating washing of repeated rains. Artificial drying best attains this end, but is of course impracticable on the large scale. In the best style of English hay-making, the grass, after being cut with the scythe or machine, and as soon as the dew is off, is shaken and spread out by means of forks or of a *tedding*-machine drawn by a horse. It is not allowed to lie long exposed in the sun, but before evening, is drawn together by rakes into *wind-rows*, which, if there is any prospect of rain, are made up into small heaps or cocks. It is again spread out next morning, or on the return of favorable weather; and when the operations are expedited by wind and sun, the hay will be ready for the rick by the second or third day. There is, however, much difference in the time during which the hay requires to lie out; the bulk of the crop and the quality of the land must be especially considered. When the grasses are cut, as they should be when in bloom, and before their seeds ripen and their stems get tough and hard, they contain the largest amount of moisture, and require careful making, but produce then the most nutritive and palatable hay. As soon as it is thoroughly dry, it should be put at once into the stack or rick, and well trodden down. A certain amount of heating improves the flavor, and renders the hay more palatable to every sort of stock. When, as is sometimes the case, it is

imperfectly made, or picked up too soon, it gets overheated, and becomes dark brown or black, its nutritive properties are diminished; it is, moreover, apt to disagree with both horses and cattle, and can only be profitably used when mixed with straw and cut into chaff. Hay put together when damp from rain or dew does not heat, as when it contains an undue amount of natural moisture, but speedily molds. When hay has been weathered and injured by repeated rains, it may be rendered more palatable by scattering a little common salt over the rick whilst it is being built. Throughout Scotland eight or ten pounds of salt to the ton is very generally used alike for the clover and grass hay. In the midland and southern districts of England the best hay is generally got up in June; but in Scotland, little is carried until the middle of July. When the crop is good, and everything done well, the cost of hand and horse labor expended upon the hay before it is safely ricked will approach 20s. per ton. The crop averages from one to two tons per acre. Hay that has stood for seed is tougher and less nutritive than that cut earlier, for the sugar, gum, and gluten of the matured seed have been abstracted from the stems, which are then apt to be little better than straw. For milch cows, well-made English hay is deservedly prized; but good clover-hay is richer in albuminous matters, and better adapted for horses and sheep.

HAY, JOHN; b. Ill., 1839; educated at Brown university; admitted to the Illinois bar, and in 1861 was private secretary to president Lincoln. For a time after the assassination of the president, he served as staff officer in the army. In 1865 he was secretary of the American legation in Paris, and in 1868 in the same position in Madrid. He returned in 1870, and took an editorial position on the *New York Tribune*. He has published *Pike County Ballads* and *Castilian Days*.

HAYBOTE, in English law, is an implied right or liberty of a tenant to take thorns and other wood off the lands he occupies, to repair the hedges, gates, and fences thereof. It also includes wood taken to make rakes and forks for gathering hay, whence the name is derived.

HAYDEN, FERDINAND VANDEVEER; b. Mass., 1829; graduated at Oberlin college; studied medicine in Albany, and took his degree (Albany medical college) in 1853. In that year he commenced the series of scientific explorations which have made his name famous by an examination of the remains of extinct animals found in the "bad lands" of Dakotah. The next three years were passed in a similar exploration of the upper Missouri, resulting in the discovery of an important collection of fossils, which was afterwards divided between the academies of science of St. Louis and Philadelphia. Being appointed geologist of a government expedition to the northwest, he acted in this capacity until the outbreak of the rebellion, when he entered the union army as a surgeon. He rose to be chief medical officer of the army of the Shenandoah. In 1865, and until 1872, he was professor of geology and mineralogy in the university of Pennsylvania, vacating this post on account of his duties in connection with the U. S. geological survey of the territories, which had been placed in his charge in 1867. The reports of the explorations for this survey have been printed by the U. S. government in octavo volumes, and with quarto volumes of illustrations. One important result of these reports was the setting apart by the U. S. government of the lands now forming the National park in the Yellowstone valley, covering a territory more than 3,500 sq. m. in area. Prof. Hayden's work has added to the reputation of this country for scientific exploration.

HAYDN, JOHN MICHAEL; 1737–1806; b. Germany; a brother of the great composer, and himself an organist and composer of merit. He was chapel-master at Salzburg, where he had a school of counterpoint. His works were many, and it is said that his brother thought him the foremost composer of sacred music of his time.

HAYDN, JOSEPH, a German composer, was b. at the village of Rohrau, on the confines of Hungary and Austria, Mar. 31, 1732. He was the son of a poor wheelwright; and manifesting great musical talent, he was received, at the age of eight, into the choir of the cathedral of St. Stephen's, at Vienna. Here he remained till his 16th year, acquiring a practical rather than a theoretical knowledge of his art, by singing the music of the best Italian and German religious composers. In that year, however, his voice broke, and he lost his place as a chorister. He now gave lessons in Vienna, played in the orchestra, occupied himself with composition, and in this manner earned a maintenance. At the same time he studied with extreme care the first six sonatas of Emanuel Bach, which had accidentally fallen into his hands. His position, however, continued very critical, and he was on the verge of starvation, when he had the good fortune to obtain as a pupil a little girl, Signora Martinez, who was being educated at Vienna under the care of the poet Metastasio. Haydn embraced this opportunity of making himself acquainted with the Italian language. Subsequently, Metastasio introduced him to the celebrated singer Porpora, who employed him to accompany him on the piano during his singing lessons, and from whom he obtained the instruction in composition he so anxiously desired and needed. In the latter part of 1750, he composed his first quartet for stringed instruments, and from this period his prospects rapidly brightened. In 1759 a certain count Morzin engaged him as music director and composer, "with a salary of 200 florins, free lodgings, and table with his secretaries

and other officials." About this time, Haydn married the daughter of a hairdresser, who had been kind to him in his days of penury. This marriage did not prove a happy one. "It is nothing to her," said Haydn near the close of his life, "whether her husband be a cobbler or an artist." Her sole ambition was to squander Haydn's earnings. In 1760 prince Esterhazy placed him at the head of his private chapel. For him Haydn composed his beautiful symphonies (a style of composition in which he greatly excelled all his predecessors, and the greater number of his magnificent quartets. While in this situation, his patron conceiving the design of dismissing the band, Haydn composed the famous symphony known as *Haydn's Farewell*, in which one instrument after another becomes mute, and each musician, as soon as he has ceased to play, puts out his light, rolls up his music, and departs with his instrument. It is said that in consequence the prince changed his mind, and did not dismiss the band. After the death of prince Esterhazy, in 1790, Haydn accompanied Salomon the violinist to England, where, in 1791–92, he produced six of his *Twelve Grand Symphonies*. His reception was brilliant in the highest degree. In 1794 he made a second engagement with Salomon for England, and during this period brought out the remaining six symphonies. In England he first obtained that recognition which afterwards fell to his share in his own country. On his return to Austria he purchased a small house with a garden in one of the suburbs of Vienna. Here he composed his oratorios, the *Creation* and the *Seasons*. The former work, the harmonies of which are pervaded with the fire of youth, was written in his sixty-fifth year, and is considered by many to be equal to the finest productions of Handel; the *Seasons* (completed in eleven months) was almost his last work. He died at Vienna, May 31, 1809.

Although Haydn composed slowly and very carefully, his works are exceedingly numerous, comprising 118 symphonies, 83 quartets, 24 trios, 19 operas, 5 oratorios, 163 pieces for the baritone, 24 concertos for different instruments, 15 masses, 10 smaller church-pieces, 44 sonatas for the pianoforte, with and without accompaniments; 12 German and Italian songs, 39 canzenets, 13 hymns in three and four parts, the harmony and accompaniment to 365 old Scottish songs, besides a prodigious number of divertissements and pieces for various instruments.—Compare Griesinger, *Biographische Notizen über Haydn* (Liep. 1810); *Vie de Haydn* (Paris, 1817); Grosser, *Biographische Notizen über Haydn* (Hirschb. 1826); *Pohl, Joseph Haydn* (Part I. 1875).

HAYDON, Benjamin Robert, an English painter, was b. at Plymouth, Jan. 25, 1786. He exhibited his first picture at the academy in 1807, "Joseph and Mary Resting with our Savior after a Day's Journey on the Road to Egypt," which found a purchaser in the author of *Anastasius*. It was succeeded by "Dentatus." Haydon quarreled with the academy about the hanging of this picture, and his life thereafter was divided between painting and controversy. His pictures brought him admiration, and his willful temper procured him foes. As years passed on the admiration cooled, while the foes remained virulent as ever. At this period, he had many patrons, and his pictures brought large prices; his "Judgment of Solomon," for instance, 700 guineas. He made several attempts to be admitted as associate of the academy, and when he was refused he characteristically imputed the refusal to the envy and jealousy of the academicians, and railed against them more bitterly than ever. His great work, "Christ's Entry into Jerusalem," was exhibited by himself in 1820, but did not find a purchaser. Nothing daunted, Haydon painted two other subjects from the passion of the Savior. In 1821 he married, and two years thereafter he produced the "Raising of Lazarus," in some respects the most powerful of his works. This style of subject—covering enormous canvases—not hitting the public taste, he became involved in pecuniary embarrassments, and was finally incarcerated in the king's bench, from which, after a time, he was released through the assistance of his friends. While in prison he painted the "Mock Election," which George IV. purchased for 500 guineas. Of his succeeding works, "Napoleon Musing at St. Helena," excited admiration, and was frequently reproduced. In 1836 he was again imprisoned for debt, and was released on a settlement being effected with his creditors. At this time he forsook the brush for the platform, and his lectures on art brought him fame and money. When government determined to decorate the new houses of parliament with pictures, Haydon engaged in the competition, and was unsuccessful. This defeat he never entirely recovered. He exhibited two of his latest productions in 1846 at the Egyptian hall, but the exhibition was coldly regarded by the public. This was the drop which made the cup overflow. On June 22 he died by his own hand. See his *Life* by Tom Taylor (1852), and his *Correspondence and Table Talk*, by his son (1876).

HAYDUCKS. See Haiducks, *ante*.

HAYEL, or Hail, an Arabian city, capital of the sultanate of Shomer, about 250 m. n.e. of Medina; pop. 12,000. It is a walled town, with towers and gates, and room for 20 times as many inhabitants as it contains. The chief building is the sultan's palace which has a tall oval tower. Hayel is a place of considerable trade.

HAYES, Augustus Allen, American chemist, was b. at Windsor, Vt., Feb. 28, 1806; educated at the military academy in his native town; studied chemistry under prof. Dana of Dartmouth college; and in 1825, distinguished himself by his researches into the proximate elements of American medicinal plants, discovering the organic alkaloid

sanguinaria; and in 1827, investigated the compounds of chromium. In 1828—having removed to Boston—in connection with the growing manufactories of New England, he devoted himself to the chemistry of commerce, of dyeing, and the manufacture of copper and iron. His numerous papers were published in the *Proceedings* of the Boston society of natural history, *American Journal of Science, Annual of Scientific Discovery*, etc. In 1837 his investigations into the generation of steam and economy of fuel, led to the construction of improved furnaces and boilers. He also discovered the process of reducing pig to malleable iron without loss by the use of the oxides of iron; new processes in copper-smelting, the decomposition of alcohol, and formation of chloroform; and the oxidation of alcohol in the human system. As state assayer of Massachusetts, and in the employ of the federal government, he made important investigations into the properties of guano; examined the constitution of sea-water at various depths, and its effects on the copper-sheathing of vessels; and by a series of useful studies and experiments has added to the national wealth and the domain of science.

HAYES, Isaac I., M.D., American explorer, was b. about 1830, educated to the medical profession, and appointed surgeon to the Arctic expedition under Dr. Kane, with which he returned to the United States in 1855, convinced that there existed an open sea around the n. pole, and anxious to head an expedition for its exploration. In this project he was aided by Mr. Henry Grinnell, by the American geographical and statistical society, and by sir R. I. Murchison and the geographical society of London. In June, 1860, he fitted out a schooner of 133 tons, and sailed from New York; July 6, 1860, penetrated to 82° 45′ n. lat., making extensive explorations and observations of the coasts and their inhabitants, and returned to Boston Oct., 1861. In 1867 he published *The Open Polar Sea, a Narrative of a Voyage of Discovery toward the North Pole, in the Schooner United States;* in recognition of which he was awarded a gold medal by the Royal geographical society of London, and a similar honor by the geographical society of Paris. In 1869 Hayes again visited Greenland, and explored the southern coasts of that country.

HAYES, Rutherford Birchard, twentieth president of the United States, was b. at Delaware, Ohio, Oct. 14, 1822. Adopted by a wealthy uncle, he graduated at Kenyon college, Ohio; and having studied law at Harvard, he practiced as a lawyer in Ohio. In the civil war Hayes served with distinction as an officer of volunteers, being once severely wounded, and ultimately rose to be maj.gen. In 1865 he resigned his commission, on being sent by Ohio as representative to congress. Chosen governor of his state in 1867, he was re-elected in 1869 and again in 1875. He was finally selected as the republican candidate at the presidential nomination of 1876. After the election, difficulties as to the reckoning of the votes arose in consequence of the denial by the democrats of the validity of those for Louisiana, Florida, and Oregon. A special electoral commission of fifteen, created for the purpose from amongst senators, representatives, and supreme judges, gave all the disputed votes to Hayes, who accordingly obtained a majority of one over Mr. Tilden, the democratic candidate. Two features in Hayes's policy have been a reform of the civil service—opposed by his own party—and the conciliation of the southern states. The bill for the monetization of silver was carried in 1878 against the president's veto.

HAYES, Rutherford Birchard, LL.D., 19th president of the United States, was b. in Delaware, Ohio, Oct. 4, 1822. Both his paternal and maternal ancestry, it is claimed, can be traced back, each to a Scottish chieftain of noble blood, who fought side by side with Robert Bruce, and he is a descendant in the sixth generation of George Hayes, who left Scotland in 1680 and settled at Windsor, Conn. His grandfather, Rutherford Hayes, born in New Haven, Conn., in 1756, settled in Brattleboro, Vt. Here the father of the president, also named Rutherford, was born. He married Sophia Birchard of Wilmington, Vt., in Sept., 1813, and soon afterwards emigrated to Delaware, Ohio, where he died less than three months before the birth of his now distinguished son. The widow found support in her bachelor brother, Sardis Birchard, who interested himself especially in the welfare of her youngest child. When the boy was 16 years of age his uncle sent him to Kenyon college, where he was graduated at the head of his class in 1842. He chose the profession of a lawyer and began his studies in the office of Thomas Sparrow, esq., of Columbus. Subsequently he spent two years as a student in the law school at Cambridge, Mass. In 1845 he was admitted to the bar at Marietta, Ohio, and soon afterwards entered into practice at Fremont, the residence of his uncle Sardis Birchard, then a wealthy banker. In 1849 he removed to Cincinnati, where he soon gained a remunerative practice. He became a member of the Cincinnati literary club, which embraced among its members Salmon P. Chase, gen. John Pope, gov. Edward F. Noyes, and other scarcely less distinguished men. He became prominent in his profession, important and difficult cases being confided to his care. He married about this time Miss Lucy Ware Webb. In 1856 he was nominated as a candidate for judge of the court of common pleas, but refused to accept the nomination. Two years later he was elected to the office of city solicitor, to fill a vacancy, and was afterwards elected for a full term by the popular vote. In 1861, when the rebellion broke out, his position at the bar was in the first rank, but he resolved to take part in the defense of the country. He enlisted for the whole war and was commissioned as maj. of the 23d

Ohio volunteers, of which W. S. Rosecrans was col. The regiment was assigned the duty at Clarksburg, W. Va., to protect the Baltimore and Ohio railroad and defend the border from raids. Maj. Hayes took a prominent part in various expeditions necessary for the defense of the post. He served for a time as judge-advocate on gen. Rosecrans's staff, discharging his duties with such impartiality as to win universal praise. In the winter of 1861–62 he took a prominent part in various expeditions into the enemy's territory, and on several occasions narrowly escaped death. In Aug., 1862, he was promoted to the colonelcy of the 79th Ohio, but he preferred to remain, with the rank of lieut.col., with the 23d, which had been incorporated with Burnside's command in the army of the Potomac. Lee was now advancing toward Maryland, and the first effort to resist him was at South mountain, where the 23d, led by Hayes, was hotly engaged. More than a hundred of Hayes's men fell dead or wounded under the enemy's fire and his own arm was broken. There was a pause for reinforcements, when a dangerous flank movement of the enemy was discovered, and Hayes, his arm bound up with a handkerchief, was again seen at the head of the regiment. He was finally carried, fainting with loss of blood, from the field. He was laid up with his wounds during the eventful days of Antietam. Upon his recovery he was promoted to the rank of brig.gen. and placed in command of the Kanawha division, of which his old regiment formed a part. He remained at Kanawha Falls until Mar. 15, 1863, when the division was ordered to Charleston, W. Va. After this he led in several important expeditions, notably in that which he himself organized to dispute the retreat of Morgan and his band of guerillas after their raid through Ohio. By a quick movement he cut off Morgan's retreat and forced him to surrender. In the famous raid upon the Virginia and Tennessee railroad, in May, 1864, he led the principal assault upon the enemy's fortifications with admirable boldness and success. He took an honorable part in the attack on Lynchburg, June 18, covering the retreat of the union forces under dangerous conditions with perfect success. In the campaign of the Shenandoah, under Sheridan, his services were conspicuous and valiant. In the battle of Winchester especially, he displayed great coolness and courage in the most trying circumstances, and when Early, a month later, renewed the fight, Hayes's superb coolness in the midst of rout and confusion acted like magic upon his men, and saved Sheridan's train from capture. In this conflict, his horse, while at full speed, fell dead beneath him, throwing him from the saddle and bruising him very badly. It was at this crisis that Sheridan, who had been absent, arrived upon the scene, when the enemy was utterly routed. For his gallant services in the engagements, Hayes was brevetted maj.gen. He was a republican from the moment when the party was formed, and had taken an active part in the political campaign of 1860. His achievements in the war made his name a power in Ohio, and when the republicans of the 2d district felt the need of a popular candidate for congress, he consented to accept the nomination, with the understanding that he would not take the seat unless the war should meantime be ended. His party friends, feeling the need of a strong effort to secure his election, besought him to take part in the canvass. In reply to their entreaties he wrote: "Any man who would leave the army at this time to electioneer for congress ought to be scalped." He was elected by a large majority, but refused to take his seat until, as he said, he could "come by the way of Richmond." When, after the close of the war, he entered congress, he at once drew to himself the attention of the country by his conspicuous ability. He was re-elected in 1866, but had only served through his first term when the republicans of Ohio, in 1867, nominated him as their candidate for governor, under the conviction that he was the only man whom they could hope to elect. He was chosen by a majority of 3,000, and re-elected in 1869 by a majority of 7,518. He was elected for the third time in 1875, and while occupying the place was nominated by the republican party as its candidate for president of the United States. The contest was severe and close, and after the election, disputes arose as to the electoral votes of several states. Great excitement followed, and fears were entertained of a civil commotion before the questions at issue could be settled. At length, however, it was agreed by the representatives of both political parties in congress to refer the questions in dispute to a commission composed of five senators, five representatives, and five judges of the supreme court of the United States, and to abide by its decision. The commission was appointed accordingly, and after hearing the parties upon the questions in dispute, it decided by vote of 8 to 7 (every republican voting with the majority and every democrat with the minority) that the electoral votes of the disputed states (Louisiana, South Carolina, Florida, and Oregon), should of right be given to Hayes; and he was thereby elected by a majority of one. He was inaugurated on Mar. 4, 1877. Aside from partisan disputes upon the questions adjudicated by the electoral commission, and from some of the incidents arising therefrom, his administration of the government is admitted by the best men of all parties to have been pure and honorable. In his letter accepting the republican nomination, he spoke freely of the evils and dangers resulting from the practice of regarding the offices of the national government as the "spoils" of the party in power, to be bestowed upon men as rewards for partisan services, and declared his belief that "the founders of the government meant that the officer should be secure in his tenure as long as his personal character remained untarnished and the performance of his duties satisfactory." He avowed his purpose, if elected, to conduct the administration of the government upon the principle of the

fathers, and pledged himself that "all constitutional powers vested in the executive" should "be employed to establish this reform." As to the relations of the national government to the southern states and their people, concerning which there was at the time the deepest anxiety in all parts of the country, he said: "The moral and material prosperity of the southern states can be most effectually advanced by a hearty and generous recognition of the rights of all by all—a recognition without reserve or exception. With such a recognition fully accorded, it will be practicable to promote, by the influence of all legitimate agencies of the general government, the efforts of the people of those states to obtain for themselves the blessings of honest and capable local government. Let me assure my countrymen of the southern states that if I shall be charged with the duty of organizing an administration, it will be one which will regard and cherish their truest interests—the interests of the white and colored people both, and equally; and which will put forth its best efforts in behalf of a civil policy which will wipe out forever the distinction between north and south in our common country." Mr. Hayes believed that he owed his election to the confidence in him on the part of the electors, which these avowals created, and he felt in honor bound to fulfill his pledges whatever might be the ultimate effect upon his own popularity. Accordingly, in his inaugural address, he said: "I wish now, when every motive for misrepresentation has passed away, to repeat what was said before the election, trusting that my countrymen will candidly weigh and understand it, and that they will feel assured that the sentiments declared in accepting the nomination for the presidency will be the standard of my conduct in the path before me." He declared that while he was "in duty bound and fully determined to protect the rights of all by every constitutional means," he was "sincerely anxious to use every legitimate influence in favor of honest and efficient local self-government, as the true resource of those states for the promotion of the contentment and prosperity of their citizens;" and in his efforts to accomplish this purpose he "asked the cordial co-operation of all who cherished an interest in the welfare of the country, trusting that party ties and the prejudice of race" would "be freely surrendered in behalf of the great purpose to be accomplished." Universal suffrage, he declared, should rest upon universal education, and "to this end liberal and permanent provisions should be made for the support of free schools by the state government, and, if need be, supplemented by legitimate aid from national authority." Acknowledging that he owed his election to the suffrage and zealous labors of a political party, he nevertheless said he should "strive to be always mindful of the fact that he serves his party best who serves the country best." These avowals on the part of the president, though eminently satisfactory to a very large body of citizens, awakened distrust in the minds of many of the leaders of the republican party, and especially among the republican members of congress; and when, not long afterwards, after full inquiry and investigation, he deemed it his duty to withdraw the troops which his predecessor had ordered to be stationed in the state-houses of Louisiana and South Carolina, doing so upon the ground that there did not exist in those states "such domestic violence as is contemplated by the constitution as the ground upon which the military power of the national government may be invoked for the defense of the state," he was denounced by many prominent members of his party as having left the enfranchised negroes of those states without the protection to which they were entitled. But time has abundantly vindicated alike the rightfulness and the wisdom of his action; and there is every reason to believe that if his party had sustained him in the course which he pursued, the best interests of the country would thereby have been promoted. The president was equally unfortunate in failing to enlist the support of his party in his efforts to reform the civil service; but, in spite of the hostility of politicians of all parties, he has been substantially true to his pledges and made the path of reform easier for his successors. Upon all political questions save those above referred to, he has been in harmony with the republican party, and by his courageous and unflinching exercise of the veto power has prevented the adoption of measures calculated to injure the credit of the country and prevent a return to specie payments. He has also, by the interposition of the same power, prevented the repeal of the laws enacted by congress, under the express authority of the constitution, to guard the purity of national elections.

HAYE'SINE, or BORATE OF LIME, known also as BOROCALCITE, HYDROBOROCALCITE, TIZA, etc., remained a mineralogical curiosity until the exhibition of 1851. It is found in some parts of Peru in rounded nodules, rarely larger than a good-sized orange, imbedded in the soil. It is always associated with the nitrate of soda, which is so abundant in that locality. Its chemical composition is $CaO,B_2O_3 + 6H_2O$; or boracic acid, 45.98; lime, 18.45; water, 35.57. It is used as a source of boracic acid in the manufacture of the borate of soda, so extensively employed as a fluxing material for glazing pottery; in glass-making, metallic soldering, etc.: the only other known sources being the boracic acid from the Tuscan springs, and the borax and tincal from Thibet. See BORAX.

HAY FEVER, HAY COLD, or HAY ASTHMA, an affection characterized by a subacute inflammation of the mucous membrane of the nasal passages, the eyes, and the bronchial tubes, with more or less febrile disturbance, headaches, and occasionally asthmatic paroxysms. The name would indicate that the emanations from hay were the sole

cause, but this is not so. The odorant matter of many flowers is as potent a cause, perhaps, as any other. Different persons are no doubt affected by different substances, the more profound cause of the disease being rather the predisposition or idiosyncrasy of the person than the peculiarity of the impinging emanation. The disease appearing only in the summer and autumn, would indicate that the idiosyncrasy requires the stimulus of some peculiar emanations only produced by nature during those seasons; but there is probably a peculiar state of the system which is only developed at those times, and only in certain persons. That the presence of the peculiar matter is as important as the idiosyncrasy is indicated by the fact that the affection soon declines after the appearance of frost. The disease will continue to annoy the patient for several weeks unless he removes to a locality where the external cause does not exist, or succeeds in cutting it short by medical treatment, which, it is held, may sometimes be done. The complaint is rather more prevalent in America than in Europe. It will not be developed at sea, and, it is said, neither in northern Canada or the southern United States. Prof. Morril Wyman, in a work on hay fever (1872), says there are two forms, one called the rose cold or June cold, corresponding to the affection known in England. The other form he calls autumn catarrh. Dr. Wyman states that going to cool mountain regions to any altitude above 800 ft. above the sea level, will give relief. Iodide of potassium, iodide of bromine, and strychnia are said to be useful as medicines, but it would be preferable to limit the treatment to removal to some locality where the disease is not developed. Prof. Helmholtz discovered minute vibrios in the mucous secretions of the air passages, upon the presence of which, it has been thought by some, the disease probably depends. The motions of these organisms have been arrested by quinine, and this drug has been suggested as a remedy, but no definite results have been obtained, and it is probably better, as above stated, to depend upon hygienic measures, including removal.

HAYNAU, Julius Jakob, Baron von, an Austrian gen., was b. in 1786, entered the Austrian service in 1801, and gradually advanced in rank, till in 1844 he was appointed field-marshal. During the Italian campaigns of 1848–49; he signalized himself by his ruthless rigor, especially at the capture of Brescia. Haynau was engaged in the siege of Venice, when he was summoned by the emperor to Hungary, in May, 1849, to take the supreme command of the forces in that country. The storming of Raab, the advance southward, the occupation of Szegedin, and the engagements on the Theiss, were all the work of Haynau. But his atrocious severity towards the defeated Hungarians, and especially his alleged flogging of women (a charge denied by Haynau), excited the hatred and detestation of Europe. In 1850 he was dismissed from public service, not for his cruelty, however, but for the intractability of his disposition. In the same year he was brought into unenviable notoriety on the occasion of his visit to the brewery of Messrs. Barclay and Perkins during his stay in London, when he was assaulted by the draymen, and barely escaped with life. For this insult the British government declined giving any satisfaction. On subsequently visiting Belgium and France, he was received by the populace with strong dislike; but by the vigilance of the authorities was preserved from actual insult. Baron Schönhals, in a biography of his friend Haynau (Grätz, 1853), tries to exonerate him from the accusation of being either constitutionally or intentionally cruel, and asserts that he only acted in obedience to the orders of his masters. Haynau died at Vienna, Mar. 14, 1853.

HAYNE, Isaac, 1745–81; b. S. C. In 1780 he was a member of the state legislature. He was taken prisoner at the capture of Charleston, and required not to bear arms against the English, agreeing to which he was permitted to visit his family, then sick with small-pox. After Greene's successes, when the British held only Charleston, Hayne was required to take up arms for the king, but he fled to the American camp. He was made a col., but not long afterwards was captured and hung by order of lord Rawdon.

HAYNE, Paul Hamilton, b. S. C., 1830; educated at Charleston, and was connected as writer or editor with various periodicals there, the *Evening News*, the *Literary Gazette*, and *Russell's Magazine*. In 1854 he published a volume of poems, of which the *Temptation of Venus* is the most noteworthy; a second volume of his poems appeared in 1857, and a third, called *Avolio*, in 1859. *The Mountain of the Lovers, and other Poems*, and *Legends and Lyrics*, appeared in 1873, and the same year Mr. Hayne edited for publication the works of another southern poet, Henry Timrod. A complete revised edition of Mr. Hayne's work is now (1881) in press.

HAYNE, Robert Young, 1791–1840; b. S. C.; educated in Charleston, and at the age of 21 admitted to the bar. He was a member of the legislature, speaker of the house, state attorney-general, and in 1823 a senator in congress. Here his enunciation of the doctrine that any state has the right to disobey and suspend such federal laws as its people might deem injurious to their interests, brought on the famous discussion between himself and Daniel Webster. The provocation was the tariff of 1824, which was strenuously opposed in South Carolina, and a state convention (Nov. 24, 1832) adopted an ordinance of nullification. As soon as the fact was known at Washington,

president Jackson issued the famous proclamation in which he declared in substance, that nullification was treason, and that the union must and should be preserved. Hayne was then governor, and replied in a proclamation of defiance, and the state prepared to resist the enforcement of the tariff laws by arms. There was no collision, however, as congress speedily modified the tariff, and the state repealed the nullification ordinance. In 1834 Hayne was chosen mayor of Charleston.

HAYNES, JOHN, d. 1654; b. England; came to Boston in 1633, and two years later was chosen governor of Massachusetts colony. In 1639 he was the first governor of Connecticut, and was re-elected every other year (as often as the law allowed) until his death. He was one of the five who prepared a written constitution for the colony, the first organic law drafted in the country, and said to embrace many of the cardinal principles of subsequent constitutions, federal and state.

HAYNES, LEMUEL, 1753–1834; a mulatto, b. Conn.; abandoned by his white mother and brought up as a servant, but educated as one of the children of a New England family. He volunteered in the revolutionary army, and was in the Ticonderoga expedition. In 1780 he worked at farming, and by firelight studied Greek and Latin and theology. In 1785 he was ordained, and was soon after settled at Rutland, Vt., where he labored 30 years. He afterwards preached in Manchester, Vt., and Granville, N. Y.

HAYS, a co. in s.w. Texas, on San Marcos river; 650 sq.m.; pop. '70, 4,088—1217 colored. Surface hilly; chief productions: corn and cotton. Co. seat, San Marcos.

HAYS, ISAAC, 1796–1879; b. Philadelphia; an American physician and scientist, graduated in 1816 of the department of arts, and in 1820 of that of medicine, in the Pennsylvania university. He edited two successive editions of Wilson's *American Ornithology*, besides several important medical and scientific works. He was sole editor from 1827 to 1869 of the *American Journal of the Medical Sciences*. He was president of the academy of natural sciences in Philadelphia from 1865 to 1869, and an active member of the philosophical society; also one of the founders of the Franklin institute, its secretary for several years, and at the time of his death its oldest member. He was one of the oldest members and for a time an officer of the college of physicians of Philadelphia; also one of the founders of the American medical association, and author of its code of ethics, which has been adopted by all the medical societies in the country.

HAYS, WILLIAM JACOB, 1830–75; a painter, who devoted his life chiefly to the painting of animals, in furtherance of which purpose he visited the upper waters of the Missouri, various northern states, and Nova Scotia. Some of his pictures are "The Herd in the Moor" (a herd of buffaloes); "The Prairie-Dog Village;" "A Bison Bull at Bay;" "Prairie on Fire;" and "Herd of Caribou in Nova Scotia." His latest work was in illustrating "The Ruminants of America."

HAYTI, otherwise known as HISPANIOLA or ST. DOMINGO, is, after Cuba, the largest of the West Indian islands, now divided into the independent states of Hayti, and the Dominican republic (q.v.). It is nearly equidistant from Porto Rico on the e., and from Cuba and Jamaica on the w., with the Caribbean sea on the s., and with the Bahamas and the open ocean on the n. Hayti lies in n. lat. between 17° 37′ and 20°, and in w. long. between 68° 20′ and 74° 28′. It belongs to the group of the Greater Antilles, and, like all the principal members of its series, its greatest length (about 400 m.) is in the direction—from w. to e.—of the chain of which it forms a part; its greatest breadth is 160 m. Area, including the islands of Tortuga, Gonaive, etc., about 28,000 sq.m., and the pop. about 760,000. The country, as the native name implies, is mountainous, being traversed longitudinally by a ridge, which sends out lateral spurs, terminating in headlands on either coast. The range is of volcanic origin—a fact still corroborated by the frequent occurrence of terrible earthquakes. Cibao, believed to be the loftiest summit, is said to be about 7,000 ft. above the level of the sea. The mountains, richly and heavily timbered, are understood to be susceptible of cultivation almost to their tops. With such a soil well watered, and with a climate tempered by the sea-breezes, Hayti, as a whole, is perphaps the most fertile spot in the West Indies; while its excellent harbors, more especially those in the bay of Gonaives on the w., offer considerable facilities to foreign trade—hurricanes, however, prevailing in Aug. and Sept. The rivers are inconsiderable, and useless for navigation. Besides several bodies of fresh water, the salt lake of Henriquillo, near the s. shore, claims particular notice, as indicating by its tidal action some subterranean communication with the Caribbean sea. The productions are coffee, logwood, mahogany, tobacco, cotton, cocoa, wax, ginger, and sugar; and mines of gold, silver, copper, tin, and iron, though not now worked, are found in many places.

Within little more than an age after 1492, the aborigines had been swept away by the remorseless cruelties of the Spaniards. In connection with this deplorable result, Hayti, already the seat of the first white settlement in America, became one of the earliest fields, in the western hemisphere, of negro servitude. Next came the bucaneers, during the 17th c., to avenge the red man's wrongs! and as those marauders were chiefly French, the western portion of the island, which was their favorite haunt, was, in 1697, ceded to France by the peace of Ryswick, thus presenting the first important break in

the unity of Spanish America. For nearly 100 years, the intruders imported vast reinforcements of Africans; while the mulattoes, who were a natural incident of the concomitant license, rapidly grew, both socially and politically, into an intermediate caste, being at once uniformly excluded from citizenship, and generally exempted from bondage. In 1791, under the influence of the French revolution, the mutual antipathies of the three classes—white, black, and mixed—burst forth into what may well be characterized as the most vindictive struggle on record—a struggle which, before the close of the 18th c., led to the extermination of the once dominant Europeans, and the independence of the colored insurgents. Thus, as the emancipated bondmen mostly belonged, at least in form to the Church of Rome, Hayti now exhibited the only Christian community of negro blood on either side of the Atlantic. In 1801 France sent out a powerful armament to recover her revolted dependency, treacherously seizing and deporting the deliverer of his brethren, Toussaint l'Ouverture. In 1803, however, she was constrained to relinquish her attempt; and in 1804, Dessalines (q. v.), aping the example of Napoleon, proclaimed himself Emperor of Hayti; thus reviving the indigenous name of the island, which had been in disuse for upwards of 300 years.

This great change was fatal to the commercial prosperity of French Hayti, decidedly the more valuable section of the island. In its progress, it had destroyed capital in every shape; and in its issue, it could not fail to paralyze labor under circumstances where continuous exertion of any kind was equally irksome and superfluous. Nor was the political experience of the lately servile population more satisfactory than its economical condition. Sometimes consolidated into one state, and sometimes divided into two, the country alternated, through the instrumentality of one revolution after another, between despotism and anarchy, between monarchy and republicanism, between a kingdom and an empire. Its only tranquil period of any duration coincided with the rule of president Boyer, which subsisted from 1820 to 1843—its last 21 years comprising not only the whole of French or western Hayti, but likewise the Spanish or eastern portion of the island. Hayti thus united, besides being immediately recognized by the European powers in general, was soon acknowledged even by France, on condition of paying 150,000,000f., or £6,000,000 sterling, as a compensation to the former planters.

About the year 1843 the inhabitants of the eastern or Spanish portion of Hayti, rising against their Haytian oppressors, formed themselves into a republic called the Dominican republic (q.v.), and in May, 1861, threw itself under the protection of Spain, a connection which was dissolved in 1865. The western portion of the island had been republican in its form of government previous to 1849, when its former president, gen. Soulouque, ascended the throne, proclaimed an empire, and assumed the title of emperor Faustin I. In 1859, however, a republic (*république de Haïti*) was again proclaimed and a new constitution adopted. The eastern, once Spanish, portion still exists as a separate republic, the *república Dominica*. Of the former the area is upwards of 10,000 sq.m., and the pop. 572,000; the latter has an area of over 18,000 sq.m., but the pop. does not exceed 250,000. The joint exports of the two republics to Great Britain in 1877 were valued at £247,300; their imports thence at £383,200. Coffee, logwood, cotton, cocoa, and wax are the chief exports. Port-au-Prince, the chief commercial city of the island, is the capital of the western republic.

HAYWARD, the name given in England to one who keeps the common herd of cattle of a town, or of a manor, when the copyhold or other tenants have the right of sending cattle to graze. In Scotland, the corresponding term is "shepherd" in rural burghs.

HAYWOOD, a co. in w. North Carolina on Big Pigeon river; 700 sq.m.; pop. '70, 7,921—515 colored. It is in a rough region between Iron mountain and the Blue ridge, but the valleys are fertile; productions: corn, tobacco, butter, wool, &c. Co. seat, Waynesville.

HAYWOOD, a co. in w. Tennessee on Hatchee river, traversed by the Memphis and Louisville railroad; 500 sq.m.; pop. '70, 25,094—13,832 colored; in '80, 23,397. It is level, with considerable forest land. The soil is fertile; chief productions: cotton, corn, and pork. Co. seat, Brownsville.

HAZÁRA, or HUZARA, a British district in the Punjab, India, 2,771 sq.m.; pop. '68, 267,218. The district forms a wedge of territory extending far into the heart of the outer Himalayan range, and consisting of a long narrow valley, shut in on both sides by lofty mountains, whose peaks rise to a height of 17,000 ft. above sea level. Towards the center of the district the vale of Khagan is bounded by mountain chains, which sweep southward, still maintaining a general parallel direction, and send off spurs on every side which divide the country into numerous minor dales. The district is well watered by the tributaries of the Indus, the Kunhar, which flows through the Khagan valley into the Jhilam (Jhelum), and many rivulets. Throughout, the scenery is picturesque. To the north rise the distant peaks of the snow-clad ranges; midway, the mountains stand clothed to their rounded summits with pines and other forest trees, while grass and brushwood spread a green cloak over the nearer hills, and cultivation covers every available slope.

HAZARD, a game at dice without tables, which can be played by any number of persons. One person, called the *caster* (his opponent who bets with him being called the

setter), takes the box and dice, and makes a throw (called a *main*), which must be above 4, and not exceeding 9; and if the first throw made is not within these limits, the caster must throw until such a one occurs. After the caster has thrown the main, he throws his own chance. The throws, 2, 3, 11, 12, are called *crabs*, and are losing throws for the caster, except in the following cases, viz., 12 when 6 is the main, 11 when 7 is the main, or 12 when 8 is the main; in these cases, and also when the caster's throw is the same as the main, the throw is called a *nick*, and the caster wins. If his throw be not a nick, or a crab, then, if he can repeat the same throw before the main turns up, he wins. If the caster throws crabs, not nicks, or if he fails to repeat his throw before the main turns up, the setter wins the stakes. The setter, on the whole, has slightly the advantage of the caster, especially if 6 or 8 be the main, when his chance is to the caster's in the proportion of 7,295 to 6,961, or 22 to 21 nearly. Hazard is exclusively a game of calculation, and is never played merely with a view to amusement. Essentially an essay of calculations and combinations, requiring a cool and clear head to execute them, it has been an incitement to the wildest schemes under the name of "systems" that ever laughed mathematics to scorn. Hazard has been long a standing game at all the houses of play in Britain, in the face of a fact, that owing to the intricacy of the calculations of probabilities, the odds in favor of the professional player over the amateur are 100 per cent. "In spirit, if not to the letter, it is the arithmetic of dice."

HAZARD, ROWLAND GIBSON, b. R. I. 1801; a member of the state legislature, but more widely known for his connection with mercantile and manufacturing interests, to which he had added authorship. Among his publications are *Essay on Languages*, *Lectures on the Adaptation of the University to the Cultivation of Mind*, *Lecture on Causes of the Decline of Political and National Morality*, *Causation and Freedom of Willing*, etc.

HAZARIBAGH', the capital of the district of the same name, province of Chota Nagpore, presidency of Bengal, is situated 239 m. to the n.w. of Calcutta, and 189 to the s.e. of Benares, in lat. 24° n., and long. 85° 24' e. Pop. '71, 11,050. On the conquest of Sinde, Hazaribagh was selected as the residence of the dethroned Amirs.

HAZEBROUCK', a small but flourishing t. of France, in the department of Nord, at the junction of the Calais and Dunkerque railways, 25 m. w.n.w. of Lille. The parish church, built 1493–1520, is surmounted by a spire of open work, 240 ft. high. Manufactures of linen-cloth and twist, soap, leather, refined salt, beer, oil, and lime, are carried on. A great linen market is held here every Saturday. Pop. '76, 6,363.

HAZEL, *Corylus*, a genus of trees and shrubs of the natural order *cupulifera*, of which the fruit is a nut in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins; the female flowers appear as mere clusters of colored styles at the extremities of buds; the male flowers are pretty conspicuous, the female flowers are very small.—The COMMON HAZEL (*C. avellana*) is a large shrub or low tree, with a bell-shaped fruit-cap, which is somewhat two-leaved, open, and spreading. It is a native of Britain, and of all the temperate parts of Europe and Asia; it is common also in North America. Hazel nuts of improved varieties are grown to a considerable extent in the south of England, particularly in Kent; they are also imported in large quantities from the south of Europe. Hazel nuts yield, on pressure, about half their weight of a bland fixed oil, often call *nut-oil* in Britain, the hazel-nut being popularly known by the term *nut* alone; but in Germany it is walnut-oil which is usually called nut-oil. Hazel-nut-oil has drying properties, and is much used by painters; it is also used by perfumers as a basis with which to mix expensive fragrant oils; and it has been employed medicinally in coughs. The wood of the hazel, although seldom large enough for the purposes of the carpenter, is very tough and flexible, and hazel-rods are therefore much used for making crates, hurdles, hoops for small barrels, etc. The thicker stems of hazel are used for making charcoal, which is in great request for forges, is much esteemed for the manufacture of gunpowder, and is the kind preferred by artists for crayons.

The value of the hazel-nuts annually imported into Britain is about £100,000. The quantity used for making oil is comparatively inconsiderable.

Most of the cultivated varieties of the hazel-nut are known by the names of *cob-nuts* and *filberts;* the former generally of a roundish form; the latter characterized by the greater elongation and laciniation of the fruit-cup; the name filbert being indeed regarded as a corruption of full-beard. The Red filbert, or Lambert's nut, is remarkable for having the pellicle which surrounds the kernel of a crimson-red color. The finer kinds of hazel are propagated by grafting and by layers. Hazel-plants for copses are obtained from seed.—The BEAKED HAZEL (*C. rostrata*), a species having a very hairy fruit-cup prolonged into a long beak, is a native of the northern parts of America. Its kernel is sweet.—The CONSTANTINOPLE HAZEL (*C. colurna*), the nuts of which are considerably larger than those of the common hazel, is a native of the Levant, from which the fruit is imported into Britain. It is much used for expressing oil, but is a less pleasant fruit than many kinds of cob-nut and filbert. A Himalayan species of Hazel (*C. ferox*) has a spiny fruit-cup, and an excessively hardnut. *Barcelona nuts* are the nuts of a variety of the common hazel, kiln-dried before their exportation from Spain. Hazel-nuts not subjected to this process cannot be kept long without losing in

part their agreeable flavor, and contracting a sensible rancidity, except in air-tight vessels, in which they are said to remain fresh even for years.

The larva of a weevil (*balaninus nucum*) feeds on the kernels of hazel-nuts. The parent female makes a hole into the nut by means of her long snout and there deposits an egg. Great numbers of nuts are thus destroyed.

HAZEN, WILLIAM B., b. Vt. 1830; graduated at West Point 1855; served on the frontier and in the war of the rebellion, being engaged in many skirmishes and battles. He became maj.gen. of volunteers, and after the war was made col. of infantry in the regular army. During the Franco-German war he was employed in studying the education and characteristics of French and German soldiers, and on his return home, wrote a work entitled *School and Army of France and Germany*. In 1877 he was appointed military attaché to the United States legation at Vienna, and in 1880, chief signal officer of the army.

HAZLETON, a t. in Luzerne co., Penn., in the midst of the coal region on the ridge between the Susquehanna and the Delaware rivers, reached by the Lehigh Valley, and by the Danville, Hazleton and Wilkesbarre railroads; pop. of township, 7,500. The coal trade is the chief business, about 1,000,000 tons being mined in this district every year. In the town are nine churches, a Roman Catholic academy and convent, a town hall, and several manufactories.

HAZLITT, WILLIAM, a distinguished English essayist and miscellaneous writer, the son of a Unitarian clergyman, was b. at Maidstone, in Kent, on April 10, 1778. His father went to America with his family when Hazlitt was about five years of age, but returned in two years, and became pastor of a congregation at Wem, in Shropshire. In 1793 Hazlitt became a student in the Unitarian college at Hackney, but did not take kindly to theological pursuits. In 1795 he left college, and returned to his father's house, where he devoted himself to metaphysics and painting; about this time he met Coleridge, and by the conversation of the poet was awakened to a keener intellectual life than he had before known. In 1802 he visited Paris, and studied in the Louvre, and on his return he attempted to support himself by portrait painting; but, as he could neither please himself nor his patrons, he relinquished the easel, and threw himself into literature, for which he was much better adapted. In 1803 he went to London, and shortly after published his essay *On the Principles of Human Action*. In 1808 he married, and retired into the country. In 1811 he was again in London. In 1813 he delivered a course of lectures on the history of English philosophy, and he subsequently delivered courses on the English poets. He wrote essays in the *Examiner* in conjunction with Mr. Leigh Hunt, which were afterwards republished in a volume entitled the *Round Table*. Other essays he collected into volumes, entitled *Table Talk* and the *Plain Speaker*. He also published *Characters of Shakespeare's Plays* and the *Spirit of the Age*. In 1822 he was divorced from his wife, and two years afterwards married a second time. He died Sept. 18, 1830. His last work was the *Life of Napoleon*, of whom he was an enthusiastic admirer. An edition of his principal works was edited by his son; and *Memoirs of William Hazlitt* were published by his grandson in 1867.

The fame of Hazlitt rests upon his essays, which are in every sense remarkable. He exhibits great acuteness and penetration in his criticism, and every now and again a passage, by reason of passionate force and *abandon*, rises into the regions of poetry. On the whole, his essays are inferior to Lamb's and Hunt's, but they contain pages quite as striking and memorable as any to be found in theirs.

HAZLITT, WILLIAM, b. England 1811; son of the essayist; a lawyer and registrar of bankruptcy in London in 1854. He has edited the writings of his father, and made translations of some of the works of Guizot, Thierry, Huc, and others. He has also re-edited *Johnson's Lives of the Poets*, and assisted in compiling a *Manual of Maritime Warfare*.

HAZLITT, WILLIAM CAREW, b. England 1834; grandson of the essayist, and a member of the English bar. He has published *History of the Venetian Republic*, *Sophie Laurie* (a novel), and *Memoirs of William Hazlitt;* and has collected and edited various works on old English poetry, proverbs, antiquities, etc.

HEAD. See BRAIN, CONCUSSION, SKULL, CAROTID ARTERIES, etc.

HEAD, Sir EDMUND WALKER, bart., for some years governor-general of Canada, was b. in 1805, near Maidstone, Kent; educated at Oriel college, Oxford, where he was first-class in classics in 1827, and became fellow of Merton; succeeded his father, the seventh baronet, in 1838; was appointed assistant poor-law commissioner, and in 1841 became poor-law commissioner. After the breaking up of the poor-law board, he was, in 1847, nominated lieut.gov. of New Brunswick. He held this post until Sept. 1854, when he succeeded the earl of Elgin as governor-general of Canada. He was the author of *The Handbook of Spanish Painting*, a *Tour in the Manufacturing Districts*, etc. Head was made a privy councilor in 1857, and K.C.B. (civil) in 1860. He resigned his post in 1861, and died in 1868.

HEAD, Sir FRANCIS BOND, bart., an author, and ex-governor of Upper Canada, was b. at Hermitage, near Rochester, in 1793. He entered the corps of royal engineers, and

had attained the rank of capt. when, in 1825, he accepted an engagement from a private company to work some gold and silver mines on the river Plate. He crossed the Pampas from Buenos Ayres to Chili, and on his return to London, published his *Rough Notes of a Journey across the Pampas*. He was made a maj. in the army in 1828; and in 1835, while holding the post of assistant-commissary of the army, on the urgent request of lord Glenelg, then colonial secretary, he accepted the govenorship of Upper Canada. He declared, in pursuance of his instructions, that an elective legislative council could not be granted, and that the crown reserves would not be abandoned, except on condition of an adequate and permanent civil list being voted. The house of assembly stopped the supplies, as a means of obtaining redress for the alleged grievances of the province. Head thereupon dissolved the house, and the result of the dissolution was in his favor. An insurrection, which had its origin, as it was said, in his injudicious measures, broke out. He had, with well-founded confidence in his own resources, sent away from Upper Canada the whole of the queen's army; and putting himself at the head of the militia, he succeeded in suppressing the insurrection. In 1838 he resigned his post, and was created a baronet. He published a *Narrative*, in answer to some severe strictures and imputations of rashness and want of judgment, to which his Canadian administration had given rise. After his retirement he devoted himself to literary pursuits. He made frequent appeals on the defenseless state of the country; he also wrote *Bubbles from the Brunnens of Nassau; A Fagot of French Sticks; A Visit to Ireland; The Emigrant; Life of Bruce the Traveler*, etc.; he was also a frequent contributor to the *Quarterly Review*, some of his articles in which were reprinted. He died at Croydon on July 20, 1875.

HEAD, Sir GEORGE, 1782–1855; b. England. In 1808 he was appointed to the commissariat of the British army in the peninsula, where he was a witness of many exciting scenes and important battles, of which he gave an interesting account in *Memoirs of an Assistant-Commissary General* attached to the second volume of his *Home Tour* published in 1837. In 1814 he was sent to America to take charge of the commissariat in a naval establishment on the Canadian lakes, and he subsequently held appointments at Halifax, and Nova Scotia. Some of his Canadian experiences were narrated by him in *Forest Scenery and Incidents in the wilds of North America*. In 1831 he received the honor of knighthood. He published *A Home Tour through the Manufacturing Districts of England*, and in 1837 a sequel to it entitled, *A Home Tour through various parts of the United Kingdom*. He also published *Rome, a Tour of Many Days*, and several articles in the *Quarterly Review*, and translated *Historical Memoirs of Cardinal Pacca* 1850, and the metamorphoses of Apuleius.

HEADACHE, a pain referred to the front, side, or back of the head, varying in intensity and other characters according to its cause and pathological relations. The most common varieties of headache are those which are dependent on, or connected with, derangements of the digestion, and frequently occur after meals. Such headaches are common among young persons, and especially young women leading lives of unnatural confinement within doors amid vitiated air. The subjects of this form of headache are usually pale and feeble, or delicate and easily flushed; they are often addicted either to sedentary occupations, or to balls, theaters, evening concerts, and other dissipations extending far into the night. The cure is so evident that it need not be insisted on as a matter of doctrine, but the practical application of the lesson is often difficult, owing to the blind devotion with which pleasure is often followed to the obvious detriment of health. Very different is the form of headache caused in older persons, and mostly in men, by a "flow of blood to the head," in connection with threatened apoplexy. In this case the habit is usually full, the complexion florid; giddiness is apt to come on in stooping, and the pain and sense of fullness and throbbing characteristic of the complaint, increase; in some cases, there is an approach to insensibility or double vision, as an additional warning. In these cases, gentle purgation and restricted diet, with exercise, will usually bring about a cure, unless there is positive organic disease. The periodic headache, or *megrim* (Fr. *migraine*, from Gr. and Lat. *hemicrania*, i.e., half the head), otherwise called *brow ague*, is a curious variety which is closely connected with malaria (see AGUE), and recurs at more or less regular intervals, affecting exactly half of the head up to the middle line. This kind is very acute, and is commonly under the control of quinine, which must, however, be given in considerable doses. The sick headache described by Fothergill is among the most distressing and intractable forms, inasmuch as it cannot usually be referred to any distinct removable cause, and is but little under the control of remedies. It is to be met, however, like the other forms, chiefly by a regulation of the whole habits of life, especially as regards habitual exercise, which may, indeed, be regarded as the great specific for all kinds of headache.

HEAD BOROUGH, in England, is the head of a borough, or high constable, the latter name being now exclusively used. In Scotland, the words "head borough" are used in another sense—viz., as the head borough in the county where the sheriff holds his court and exercises his jurisdiction.

HEAD COURTS, in Scotch law, were the sheriff courts where the freemen did suit and service annually, now abolished by the act 20 Geo. II. c. 43.

HEADLEY, JOEL TYLER, b. N. Y. 1814; graduated at Union college, studied at the Auburn theological seminary, and was for a time pastor in Stockbridge, Mass. His health failing in 1842–3, he traveled in Europe, and on his return published *Letters from Italy*, and *The Alps and the Rhine*, subsequently he published *Napoleon and his Marshals*, *Sacred Mountains*, *Washington and his Generals*, *Adirondacks, or Life in the Woods*, *The Imperial Guard of Napoleon from Marengo to Waterloo*, *History of the Second War between England and the United States*, *Life of Havelock*, *The Great Rebellion*, *Chaplains and Clergy of the Revolution*, etc. In 1856 he was elected secretary of the state of New York.

HEALDS, or HEDDLES, AND **HEALD MACHINES.** In weaving, the threads of the warp are so arranged, that at each passage of the shuttle backwards and forwards, a certain number of the warp threads are raised up, and the remainder drawn down; this is done either with vertical threads, or lines, with a small loop in the middle, through which the warp thread is passed, there being one of the vertical threads for each horizontal or warp thread. The vertical threads are called healds; and as there is continual wear upon them, it is necessary they should be of considerable strength. They also require to be particularly smooth and round, in order that they may not, by their friction in moving up and down, chafe the threads of the warp. Hence the manufacture of heald yarns is a peculiar one, and employs the chief attention of several manufacturers, particularly in the neighborhood of Bradford, in Yorkshire, where they have been brought to great perfection by Messrs. Townend Brothers and others. For some purposes, the healds are made of metal, and this class of healds is also a special manufacture. Machines have been invented for the purpose of making thread healds without knots, as the knot made by the loop is a great impediment to the free action of the heald. Such a machine was invented by Mr. Judkins of Manchester. It is so constructed as to double and twist the single yarn, and at certain points braid and plait the yarn forming the eye or loop of the heald without knot of any kind. By this machine a series of healds can be made in a continuous cord, only requiring to be cut into lengths for use. The same inventor also produced a machine which fits metallic eyes or loops in the heald.

HEALTH (from the same root as *heal*, *hale*, whole), the state of the body or mind opposed to disease (q. v.) and characterized by the integrity or soundness (Lat. *sanus*) of all the parts and functions which constitute a living being. In the more restricted and ordinary sense, health is understood as referring chiefly to the body, and as indicating that perfect and harmonious play of all the functions which permits a man to be all that his Creator intended. Even in this sense, however, it may readily be admitted that absolute bodily health is one of the rarest of endowments; in common language, accordingly, the term is accepted with an indefinite limitation, to indicate a state consistent with a life reaching its ordinary physiological limit without any manifest and considerable departure from the ideal standard.

As the absolute and extreme duration of human life is uncertain, it is usual to regard as a healthy state of the system that in which a moderate degree of activity, without pain or inconvenience, is maintained beyond the limit of threescore-years-and ten, as indicated by the Psalmist. In point of fact, however, no considerable community of human beings can be said even to approach this term of life on an average of cases. Even where the adults are more than commonly long-lived, there is always a considerable mortality at very early ages, which tends to reduce the *statistical vitality*, so to speak, of the whole community below the point which would be indicated by an average of 70 years for the population at large. Thus, in a population dying at the rate of only 15 in 1000 annually (the lowest permanent rate in the returns of the registrar-general for England), the average age at death of the community, supposing the population to be absolutely free from change, would be only 66.6; and in the case of a death-rate of 20 in 1000, the average age at death would be 50; while a death-rate of 25 in 1000 (the actual death-rate of London, the healthiest of the great European capitals) would correspond to an average age at death of not more than 40. Setting aside fluctuations of population, which always exercise a certain influence on the result of such calculations, it may be said that the average duration of life in England and Wales is about 45 years, and in Scotland somewhat less than 50 years; and to the extent expressed by these figures, the health of these two great countries falls short of the ideal standard. This subject will be more fully considered under the article VITAL STATISTICS, in which a view will be given of the phenomena of the death-rate, as affecting the calculation of premature mortality, with a view to the removal of its causes in great communities. This department of science has assumed great importance of late years, in consequence of the efforts that have been made to improve the sanitary condition of our great towns and country districts by improved drainage and sewerage, a regulated supply of pure water, and the inspection, in certain circumstances, of lodging-houses, and even of private dwellings, so as to prevent overcrowding, and the other manifest causes of the spread of epidemic disease. These, and other great practical reforms, constitute the object of what has been called the "Public Health" movement in this country, some notice of the history, progress, and practical results of which is given under the head of SANITARY SCIENCE.

HEALTH, BILL OF, in Scotch law, means an application by a prisoner to be allowed to live out of the prison, on the ground of ill health. The application is now made to the county prison board, and if allowed, the prisoner is taken to a neighboring house, and kept under surveillance. The same thing is done in England under the prison regulation acts, though the phrase bill of health is not used there.

HEALTH, BILL OF, in shipping, means a certificate of a consul, etc., as to the health of the crew, when the ship has come from a suspected port. A clean bill, a suspected bill, and a foul bill, are the three short names given to the several degrees of health.

HEALTH ASSOCIATION, AMERICAN PUBLIC. On April 18, 1872, an informal conference was held in the city of New York of gentlemen representing five states and five cities, at which a committee was appointed to draw up a constitution for the organization of a national institution for the promotion of sanitary science. The committee made their report at a subsequent meeting held Sept. 12 and 13, at which there were representatives from New York, Pennsylvania, Ohio, Illinois, Louisiana, Connecticut, Rhode Island, and the District of Columbia. A constitution was adopted, and officers elected. This constitution was slightly amended at the next annual meeting held in New York Nov., 1873, and contained among its provisions the following: "The officers shall be a president, a first and second vice-president, a secretary and a treasurer. All the officers shall be elected by ballot annually, except the secretary, who shall be elected for a term of three years." A standing, executive committee consists of "the president, first vice-president, secretary and treasurer, and six members annually elected by ballot." The objects of the association are, to a great extent, served by annual meetings, when various matters of importance relating in various ways to sanitary science are discussed, the various essays and addresses being published in an octavo volume of from four to five hundred pages. For instance, the first volume of reports contains an address by the president "On the Limitations and Modifying Conditions of Human Longevity, the Basis of Sanitary Work." Among the papers read at meetings and published in this volume of reports, which was published in 1875, are "The Relations of Race and Nationality to Mortality in the United States." "Perfection in Structure in the Human Body as a Leading Element of Hygiene," "The General Causes of Disease," "A Report on the Sanitary Care and Utilization of Refuse of Cities," "A Report on Disinfection and Disinfectants," "General Principles Affecting the Organization of Quarantine," "What Can We Do Against Cholera?" There are also various papers on the cholera epidemic in the United States in 1873, and on the yellow fever which prevailed at the same time in different parts of the southern and southwestern states. The report also contains a paper on the "General Health Laws and Local Ordinances, Considered with Reference to State and Local Sanitary Organizations," which discusses in an able manner the following subjects among others: "State Organizations Essential to Local Efficiency," "The Registration of Vital Statistics," "Definition of, and Proceedings Against Nuisances," "Popular Instruction in Physiology and Hygiene." It also gives some account of state boards of health which had been organized up to that time.

HEALTH, METROPOLITAN BOARD OF, of New York. From the year 1800 most of the health laws of New York were intended rather to exclude disease from the city than to prevent its origin. Most of the health laws passed within that period, though valuable in many respects, were not sufficiently comprehensive. In 1864 the New York Citizens' association, in connection with several physicians, made a sanitary inspection of the city, which resulted in the passage of an act Feb. 26, 1866, creating a "metropolitan sanitary district and board of health therein, for the preservation of life and health, and to prevent the spread of disease." The act provided that four suitable persons, one a resident of Brooklyn, together with the health officer of the port of New York for the time being, shall be sanitary commissioners in and for the sanitary district (the metropolitan police district); and that the said sanitary commissioners, together with the commissioners for any time being of the metropolitan board of police, not exceeding four, shall constitute a board of health for the said sanitary district. The first commissioners appointed held office for one, two, three, and four years, respectively, after which the term of office was to be four years. Provision was made for the appointment of a chief executive officer, to be called the sanitary superintendent, who was required to be a skillful physician. Many powers were conferred on the board and on the executive officer, in abating health nuisances, removing buildings dangerous to life or health, etc. Dr. Elisha Harris was appointed registrar of vital statistics. See HEALTH, MUNICIPAL BOARD OF.

HEALTH, MUNICIPAL BOARDS OF. Institutions organized under city government, and deriving powers from state laws for the purpose of protecting the health of the citizens. The present board of health of the city of New York is a municipal board. From 1866 to 1870 there was a united health department of the cities of New York and Brooklyn, under the title of metropolitan board of health (see HEALTH, METROPOLITAN BOARD OF—NEW YORK). Chapter 137 of the laws of New York, passed April 5, 1870, provides that the city of New York be exempted from the provisions of the act which created the metropolitan board of health, and also created a health department, to consist of the police commissioners of the city of New York, the health officer of the port, and also

four officers, to be called "commissioners of health of the city of New York," to be appointed by the mayor for a term of five years—two of whom must have been practicing physicians in the city for a period of five years preceding their appointment. In 1873 an act to reorganize the local government of the city of New York made the following provisions: "The health department shall consist of the president of the board of police, the health officer of the port, and two officers to be called 'commissioners of health,' one of whom shall have been a practicing physician for not less than five years preceding his appointment. The commissioner of health who is not a physician shall be president of the board, and shall be so designated in his appointment. These several officers shall together constitute a board which shall be the head of the health department. The commissioners of health, except those first appointed, shall hold their offices for six years." The act also created two bureaus, the chief officer of one to be called the "sanitary superintendent, who at the time of his appointment shall have been for at least ten years a practicing physician, and for three years a resident of the city of New York, and who shall be the chief executive officer of said department. The chief officer of the second bureau shall be called the register of records, and in said bureau shall be recorded, without fees, every birth, marriage and death, and all inquisitions of coroners which shall occur or be taken within the city of New York." By an amendment to this act, the powers conferred on the metropolitan board of health by the laws of 1866, or any subsequent laws not inconsistent with this act, are conferred upon and vested in the health department and board of health created in its place. The health department, as organized under the act, consisted of the board of health, composed of the four officers above mentioned, viz., the commissioners of health, the health officer of the port, and the president of the board of police, together with a secretary, and the following "officers of the board:" a sanitary superintendent, a register of records, an attorney and counsel, a chief clerk, a consulting sanitary engineer, a consulting pathologist, a consulting meteorologist, a consulting microscopist, a consulting veterinary surgeon, a consulting sanitary architect, nine sanitary inspectors (all of whom were physicians), sixteen assistant sanitary, twelve of whom were physicians. The secretary's department consisted of the secretary of the board, a chief clerk, an auditing clerk, and chief clerk to the secretary, and four other clerks. The attorney's department consisted of the attorney and counsel of the board, and three clerks. The bureau of sanitary inspection consisted of the sanitary superintendent, an assistant sanitary superintendent, a chief clerk to the superintendent, four other clerks, a chief of disinfecting corps, and eight other members of the disinfecting corps. The bureau of vital statistics consisted of the register of records, a deputy register of records, and eleven clerks. By chapter 677, laws of 1872, and by chapter 335, laws of 1873, "the board of police has full and exclusive power and authority, and is charged with the duty of causing all streets, avenues, lanes, alleys, gutters, wharves, piers, and heads of slips to be thoroughly cleaned from time to time, and to be kept at all times thoroughly clean."

Every city of importance in the United States has a municipal board of health. A good example is that of the health department of the city of Boston. At the present time, 1881, the board consists of three citizens, one of whom is a physician, and six "officers of the board," viz.: 1. A superintendent of health, who is not a physician; 2. a city physician; 3. an assistant city physician; 4. a port physician, and 5. a medical inspector. The seventh annual report of the board of health of Boston for the year ending April 30, 1879, is a model of brevity and conciseness. In regard to street cleaning it says: "The faithfulness and zeal with which the superintendent of health endeavors to keep the streets properly swept and free of nuisances is commendable in the highest degree. As a rule, the streets are in a cleanly condition, and a source of pride rather than a source of offense." The health department of New Haven, Conn., consists of six citizens, one of whom is a physician, a health officer, who is a physician, a quarantine officer, who is a physician, a standing committee of two, one of whom is a physician, and two sanitary inspectors. The report of the health officer for the year 1879 furnishes strong evidence that privy vaults and cesspools are the most frequent generators of typhoid fever and diphtheria to a great extent, because of the prevalent habit of having wells for drinking water in near proximity to them.

HEALTH, National Board of, an organization for the promotion of sanitary measures. It was organized under act of congress, Mar. 3, 1879, entitled "An act to prevent the introduction of infectious and contagious diseases into the United States, and to establish a National Board of Health." This provided for the appointment by the president of seven members, not more than one of whom shall be appointed from any one state, to be paid only for time in which they are actually engaged, at the rate of ten dollars a day and reasonable expenses. To these persons there are added one medical officer of the army, one medical officer of the navy, one medical officer of the marine hospital service, and one officer from the department of justice, to be detailed by the secretaries of the several departments and the attorney general respectively, the officers so detailed receiving no compensation. The board chooses its own president and makes its own rules, and also special examinations, as it may deem proper, within the United States or at foreign ports. They are to obtain information upon all matters affecting the public health, and advise the several departments of the government on all matters

submitted to them, or whenever they think advice needed. According to the first annual report made to the secretary of the treasury Jan. 1, 1880, the members of the board proceeded to organize April 2, 1879; and since the first meeting the board has met eight times, once at Atlanta, Ga., once at Nashville, Tenn., and on the other occasions at Washington. The report of the board states that these frequent meetings were necessary, because the law did not recognize the existence of an executive committee; nevertheless such executive committee held daily meetings at the national capital, and had charge of the routine business of the board. The board in their report stated that they coincided with opinions expressed in resolutions of the American public health association at a convention held at Nashville, Tenn., in Nov., 1879, and which are "that the quarantine laws of the United States should be under the direction of the National Board of Health, and of an executive committee to be selected by that body." They moreover recommend the assembling of an international health congress. They also recommend the establishment of a quarantine station at the mouth of the Mississippi river, at a place to be designated by the national board. Information was collected in regard to the sanitary condition of some of the principal cities in the United States, and a commission was appointed to investigate yellow fever in the island of Cuba. The commission sailed for Havana July 4, and returned on Oct. 4, 1879. See YELLOW FEVER. Various other questions received the attention of the board, such as diseases of food-producing animals, the merits of various disinfectants, adulterations in food and drugs, an investigation of the flow of sewers (see SEWAGE), a sanitary survey of the eastern coast of New Jersey, bordering on New York harbor, in connection with the state board of health of New Jersey, and a sanitary survey of the city of Memphis, Tenn. See SANITARY SURVEY. The report also gives a sketch of the operations of the board under the provisions of the act approved June 2, 1879, to prevent the introduction of contagious or infectious diseases. See QUARANTINE. This act states that one of the objects of the organization shall be to co-operate with and aid, as far as it lawfully may, state and municipal boards of health in the execution and enforcement of rules to prevent the introduction of contagious or infectious diseases into the United States. It is also made the duty of the board to obtain information of the sanitary condition of foreign ports and places from which contagious diseases may be imported; and it is provided that the consular officers of ports designated by the board shall make to said board weekly reports of the sanitary condition of the ports and places at which they are respectively stationed. Provision is also made for obtaining reports of the sanitary condition of ports and places within the United States, transmitting the information so obtained to the medical officers of the marine hospital service, to collectors of customs at the ports, and to state and municipal health officers, together with any important information relating to sanitary affairs which they may possess. Five hundred thousand dollars is appropriated, or so much as may be necessary to meet the expenses to be incurred in carrying out the provisions of the act, to be disbursed under the direction of the secretary of the treasury on estimates made by the board, and to be approved by him. It is also provided that the act shall continue in force for a period not longer than four years from the date of approval.

HEALTH, STATE BOARDS OF, institutions established by state legislative enactments, having many specific relations in regard to the public health, but intended to have a central advisory relation with local sanitary organizations, and also to superintend a state system of vital statistics. There are now in the United States 24 state boards. Massachusetts was the first to organize such a board, which she did in June, 1869, under a law which had been steadily asked for since 1850. California was the next state to organize a board, in 1870; Michigan and Louisiana followed in 1871, and Minnesota and Virginia in 1872; Alabama, Maryland, and Georgia in 1875; Colorado and Wisconsin in 1876; New Jersey and Illinois in 1877, Connecticut, Kentucky, Tennessee, Mississippi, and Rhode Island in 1878; Arkansas, Delaware, North Carolina, and Texas in 1879, and New York and South Carolina in 1880.

The act establishing the state board of health of New York was passed May 18, 1880. It provides for the appointment of "three state commissioners of health, two of whom shall be graduates of legally constituted medical colleges. The said commissioners together with the attorney-general, the superintendent of the state survey, and the health officer of the port of New York, who shall be ex officio members of the state board of health, and three other persons to be designated and appointed by the governor, one of whom shall be a commissioner of health of the board of health of the city of New York, and the others shall be members or commissioners of health of regularly constituted and organized boards of health of cities of the state, shall constitute a board of health of the state of New York." The said three commissioners first named shall hold their office for three years, and whenever a vacancy occurs the place shall be filled as in other cases provided by law. Meetings shall be held at least once in every three months, and as much oftener as shall be deemed necessary. No member of the board except the secretary shall receive any compensation, but the actual traveling and other expenses of the members and officers while on duty shall be allowed and paid out of the appropriation made for its support. They shall elect annually one member of the board to be president, and from their own members or otherwise a person of

skilled experience in public health duties to be secretary and executive officer of the board, who shall have all the powers and privileges of a member of the board, except in regard to voting upon matters relating to his own office, to hold office for three years. The state board has the general supervision of the state system of registration of births, marriages, and deaths, and also of prevalent diseases. There are in (1880) the state of New York 333 incorporated villages, each of which under a general statute of 1870 may have a good local board of health. There are besides 939 townships, each of which may organize a local board of health, which shall consist of the supervisor and a majority of the justices of the peace of the township. They are required to appoint a competent physician as health officer, who has the largest powers conferred on him by a state law of 1850, such as power to quarantine places, regulate sources of disease, disinfect, etc. The state board is continually causing sanitary surveys to be made of sickly localities, and there form data for present and future sanitary work.

HEALY, GEORGE PETER ALEXANDER, b. Boston, 1813, portrait painter, studied several years in Paris. His largest picture, "Webster's Reply to Hayne," containing 130 portraits, is in Faneuil hall. In the Paris exhibition (1855) he was awarded a medal for his picture of "Franklin urging the Claims of the American Colonies before Louis XVI." Among many portraits from his pencil are those of Louis Philippe, Marshal Soult, gen. Cass, Calhoun, Webster, Pierce, gen. Sherman, Brownson, Prescott, Longfellow, Guisat, George Peabody, cardinal McCloskey, and William H. Seward. He painted nearly 600 portraits within 20 years.

HEARD, a co. in w. Georgia on the Alabama border, intersected by the Chattahoochie river, 375 sq.m.; pop. '70, 8,769—3,095 colored. It is hilly, and largely covered with forests; soil fertile; chief products: cotton, wheat, corn, etc. Co. seat, Franklin.

HEARD'S ISLAND, in the s. Indian ocean, 280 m. s.e. of Kerguelen Land, in about 53° s. and 73° east. It measures about 30 by 10 m., and has a peak 6,000 ft. above sea level.

HEARING. See EAR.

HEARING OF A CAUSE is the phrase used in the court of chancery, when the merits of the case and the arguments on both sides are entered upon. The same phrase is used in cases before magistrates. But at common law, if it is a jury case, the corresponding term is "the trial;" and if it is a case before the judges in banc, it is called "the argument." In Scotland, it is called "the debate," if before the judges; if before the jury, "the trial."

HEARING IN PRESENCE, in the law of Scotland, means a hearing of a difficult or important case before the whole of the thirteen judges of the court of session. It is competent for either division of the court of session, when equally divided in opinion on a case, to appoint a hearing before the whole judges, which is in fact a reargument. In England it is not in general competent for any court, when equally divided, to order a case to be argued before all the other courts sitting together. The only case in which it occurs is where the court of criminal appeals has heard a case, and the judges differ considerably, or think it a very important case, when it is ordered to be argued before the full court, which consists of all the fifteen common law judges. It is then called a hearing before the full court.

HEARSAY EVIDENCE is the name given by lawyers to evidence given in a court of justice at second-hand, where the witness states not what he himself saw or heard, but what somebody else said. This evidence is, as a general rule, inadmissible, because the axiom is, that the best evidence that can be had must be produced, and therefore each witness must be confined to stating what he knows of his own personal knowledge, or what he has learned by the aid of his own senses; and as he is sworn to the truth, his truthfulness is thus secured, as far as human testimony can be so. If evidence were once admitted at second-hand, there would be no limit to its uncertainty, and there would be thus introduced vague statements of absent persons, who, not being sworn when they made them, are therefore incapable of being punished if they speak falsely, and cannot be cross-examined. Though such is the general rule, yet there are a few exceptions which are unavoidable, owing to the nature of the thing. Thus, in proving pedigrees, the hearsay evidence of persons connected with the family, and those only, is admitted in England; but in Scotland it is admitted though the persons were not connected with the family. A remarkable exception also exists in the case of dying declarations, i.e., statements made by persons mortally wounded and in the prospect of death; but in England such evidence is only admitted in criminal cases, on a charge of manslaughter or murder. In Scotland such declarations are admitted in all cases of violence, and though the party at the time did not believe he was dying. There is another exception to the non-admissibility of hearsay evidence allowed in Scotland, but not in England, viz., where the person who made the statement is dead, and therefore cannot be produced as a witness. In England there is no help for such a state of things, and the statements of the dead person cannot be admitted; but in Scotland, if there was no reason to suppose the contrary, it is presumed the dead witness spoke the truth, and what he said may be given in evidence for what it is worth, both in civil and

criminal cases. A few other exceptions, of a less important description to the above general rule, exist in both countries, which are too technical to be here noticed.

HEARSE. See HEARSE, *ante*.

HEART. See CIRCULATION OF THE BLOOD.

HEART, DISEASES OF THE, a class of serious, and often fatal disorders affecting the great center of the circulation, the accurate knowledge of which may be dated from the application of auscultation (q.v.) and percussion to the purposes of diagnosis. The great names of Corvisart and Laennec stand foremost in the modern investigation of cardiac diseases, Dr. Hope of London, and a great number of living physicians, having largely contributed to the existing knowledge of the subject, which had, however, been carefully studied by Morgagni and the great morbid anatomists of the 18th c., as well as by Senac and Testa, without the advantage of the more recent means of diagnosis. The limits of this article admit of only a very slight sketch of a subject of vast extent, and on which the literature of the last 50 years is unusually copious and exhaustive.

Diseases of the heart may be roughly divided into the functional and organic—in the former of which no appearances adequate to account for the symptoms are found in the dead body, while in the latter the contrary is the fact. To the former class belong simple palpitation, syncope, and the peculiar disorder termed angina pectoris; to the latter, hypertrophy of the heart, dilatation of the cavities, with various structural diseases of the endocardium and pericardium, of the muscular fiber, and of its nutrient arteries. To these may be added the disease of the aorta, and especially aneurisms of its thoracic portion. We propose to review very briefly these different morbid conditions.

Palpitation, or undue and often irregular action of the heart, attended by uneasy sensations of movement, is a disorder common to many organic diseases of the heart, and not unfrequently also occurring in debilitated states of the system, without any organic disease whatever. In exhausted and anxious men of business, in hysterical and anæmic women, in habitual smokers, in dyspeptics, in persons debilitated by discharges from the mucous membranes, a degree of palpitation is quiet common, and the symptom sometimes assumes the apparent form of an independent disease, especially when aggravated by mental anxiety in respect to its true significance. The treatment is entirely guided by the facts of the individual case; but generally speaking, the negative results of physical diagnosis, with the positive knowledge of the cause, suffice to reassure both practitioner and patient, and lead to a correct adaptation of means to the end in view.

Syncope, or swooning, is, as every one knows, much more commonly a functional than an organic disease. See FAINTING.

Angina pectoris, or breast-pang, also called *syncope anginosa*, is a peculiar painful or oppressive sensation, very characteristic of cardiac diseases, especially of such as are apt to prove suddenly fatal. It is needless to add that this form of disease is of great importance, and of very dreadful significance. The two leading elements in the sensation referred to, according to Dr. Latham, are the pain and the sense of impending death. The sensation is entirely different from breathlessness, although often mixed up with this in the mind of the patient. Where the sudden, death-like paroxysm of angina comes on in the absence of medical assistance, the proper remedies are, warmth to the extremities, stimulants, and moderate doses of laudanum or opium; but no time should be lost in procuring the aid of instructed persons, as errors in the administration of these powerful remedies might be more rapidly fatal than the disease itself.

Asthma, and difficulty of breathing depending upon the lungs, especially that form of difficult breathing called *orthopnœa*, when the patient is unable to lie down in bed, are symptoms very characteristic of some kinds of disease of the heart and great vessels.

The organic diseases of the heart are very numerous; most of them are attended by one or other of the symptoms above mentioned, and almost all of them involve danger to life more or less considerable. It is nevertheless true that public opinion, nowadays, is prone to overrate the tendency to death, and especially to sudden death, in some of these diseases. Strictly speaking, a sudden death—i.e., a death quite unexpected, and in the midst of apparent good health—is a rare and exceptional fact in organic disease of the heart; the most frequent instances being in connection with aneurisms (q.v.) of the great vessels, fatty degeneration of the heart's fiber, and extensive calcareous degeneration of the coronary arteries of the heart, often producing marked symptoms of angina pectoris, as above referred to.

The *valvular diseases of the heart* are among the most frequent and the most easily recognizable of its organic disorders. They depend essentially upon changes in the endocardium, or internal lining membrane (endocarditis); in many cases these changes originate in attacks of rheumatic fever (see RHEUMATISM), which is therefore to be viewed with suspicion as a disease tending to shorten life, especially when developed during early youth. The valves affected are usually those of the left side, and the consequence may be either imperfect closure of the valve, leading to regurgitation of blood, or obstruction of the orifice. In either case, there is a mechanical impediment to the circulation, of a more or less serious kind, followed by dilatation of the cavities of the heart and hypertrophy of the walls, especially of the ventricles. For a time the circulation is kept up under these unfavorable conditions by increased efforts of the organ;

but ultimately its balance is fatally disturbed, blood accumulates in the liver, the lungs, or others of the internal organs, and secondary diseases take place, of which dropsy (q.v.), albuminuria, and hæmoptysis, or spitting of blood, are among the most frequent and formidable.

Pericarditis, or inflammation of the pericardium, i.e., the heart-purse, or fibrous sac investing the heart, is, like endocarditis, a frequent consequence of acute rheumatism. In numerous instances, it ends favorably, but in some cases it is fatal by large effusion of fluid, and in others by adhesions between the external membrane and the heart.

The treatment of all these diseases must be strictly regulated by medical advice.

HEART, SOUNDS OF THE. On applying the ear to the cardiac region of a living man or mammal, in a state of health, two successive sounds are heard, each pair of which corresponds with one pulsation. These are known as the *first* and the *second* sound. There is scarcely any interval between these two different sounds, the second one following immediately upon the conclusion of the first; but after the second sound there is a perceptible pause before the first sound is again heard. The *first* sound is dull and prolonged, while the *second* is short and sharp, and the difference between them is well expressed (as Dr. C. J. B. Williams has remarked) by articulating the syllables lubb dŭp.

The cause of the first of these sounds has been a subject of much discussion, at least 30 explanations of its mode of production having been offered. During the first sound, several distinct actions are taking place, to each of which it has been ascribed by different physiologists. Thus we have (1) the impulse of the apex of the heart against the side of the chest; (2) the contraction of the muscular walls of the ventricles; (3) the tension of the auriculo-ventricular (tricuspid and mitral) valves (see CIRCULATION); (4) the rush of blood through the narrowed openings of the aorta and pulmonary artery; and (5) the collision of the particles of blood with one another, and their friction against the sides of the heart's cavities.

The hearts of mammals being constructed like our own, give out sounds different in degree, but not in character, from the sounds heard in man. In birds (if we except the ostrich and the apterix, whose hearts approximate to the mammalian type), there is no perceptible difference between the first and second sound; and Dr. Halford has ingeniously explained why this should be in his essay on *The Action and Sounds of the Heart.* The action of the heart in reptiles (the alligator, python, and turtle) seems to be accompanied with no definite sounds.

When the valves are changed by disease, the sounds undergo special alterations, which are of the highest importance in diagnosis.

HEARTH-MONEY, an old tax in England, abolished by 1 Will. and Mary, s. 1, c. 10.

HEARTS CONTENT, a port of Newfoundland on Trinity bay, 47° 50′ n. and 53° 20′ w. It is an excellent harbor, and the surrounding scenery is fine. The Atlantic telegraph cables land here.

HEAT, the unknown cause of the sensation of warmth, and of a multitude of common phenomena in nature and art. In considering this subject scientifically, it is necessary, at the outset, to discard the ideas conveyed by the popular use of such words as heat and cold. A number of bodies, however different, left for a long enough time in the same room, must, as we shall see further on, acquire the same *temperature*, or become in reality equally warm. Yet in popular language, some, as metals, stones, etc., are pronounced to be cold, and others, as flannel and fur, warm. The touch, then, is *not* a means by which we can acquire any definite idea of the temperature of a body.

Nature of Heat.—A heated body is no heavier than it was before it was heated; if, therefore, heat be a material substance, as it was long considered, it must be *imponderable.* And, in fact, under the name of caloric or phlogiston, it is classed, in almost all but modern treatises, as one of the family of imponderables. But if it were *matter*, in any sense of the word, its quantity would be unchangeable by human agency. Now we find that there are cases in which heat is produced in any quantity without flame, combustion, etc., as in melting two pieces of ice by rubbing them together, and also cases in which a quantity of heat totally disappears. This is utterly inconsistent with the idea of the materiality of heat. The only hypothesis that at all accords with the phenomena is, that *heat is a form of motion*, and with this idea we shall start.

Measure of Heat.—Whether it be a vibration, such as light and sound (in some cases, it certainly is), or consist in a succession of *impacts* of the particles of bodies on each other (as in some cases it has been considered to be), it is none the less certain that the *amount* of heat in a body is to be measured by the vis-viva (see FORCE) of moving particles. But as we cannot observe those particles so as to ascertain their vis-viva, we must have some means of measuring the temperature of a body, depending upon an *effect* of heat. Whatever that effect may be, it is obvious that, as the laws of nature are uniform, it will afford us a *reproducible* standard, by which we can estimate its amount at any time and in any place, and compare that amount with another observed somewhere else; just as the French mètre (q.v.) is reproducible at any time, being the ten-millionth part of a quadrant of the meridian.

Dilatation or Expansion.—Now, the most general and notable effect which heat produces on matter is to *expand* it. The length of a metallic bar varies with every change

of temperature, and is ever the same at the same temperature. The fixing of the tire of a cart-wheel is a very good instance. No hammering could fit an iron hoop so tightly on the woodwork of the wheel, as the simple enlarging of the tire by heat, and its subsequent contraction by cold. It is thus possible to *slip* it on, and an enormous force is secured to bind the pieces together. In almost every kind of structure, the expansion and contraction from changes of temperature require to be guarded against. In the huge iron tubes of the Britannia bridge, the mere change of the seasons would have produced sufficient changes of length to tear the piers asunder, had each end of the tube been fixed to ma-onry. Watches and clocks, when not compensated (see PENDULUM), go faster in cold weather, and slower in hot, an immediate consequence of the expansion or contraction of their balance-wheels and pendulums.

If a flask *full* of water or alcohol be dipped into hot water or held over a lamp, a portion of the liquid runs over; a glass shell which floats in a vessel of water, sinks to the bottom when the water is heated; and as water is heated, the hotter water continually rises to the surface. Indeed, if the latter were not the case, it would be impossible to prevent explosions every time we attempted to boil water or any other fluid. If a bladder, partly filled with air, and tightly tied at the neck, be heated before a fire, the contained air will expand, and the bladder will be distended. As it cools, it becomes flaccid again by degrees.

These and like instances are sufficient to show us that *in general* all bodies expand by heat. In order, then, to prepare a reproducible means of measuring temperature, all we have to do is to fix upon a substance (mercury is that most commonly used) by whose changes of volume it is to be measured, and a reproducible temperature, or rather two reproducible temperatures, at which to measure the volume. Those usually selected are —that at which water freezes, or ice melts, and that at which water boils. In both of these cases, the water must be *pure*, as any addition of foreign matter in general changes the temperature at which freezing or boiling takes place. Another important circumstance is *the height of the barometer*. See BOILING. The second reproducible temperature is therefore defined as that of water boiling in an open vessel when the barometer stands at 30 inches. In absolute strictness, this should also be said of the freezing-point, but the effect on the latter of a change of barometric pressure is practically insensible. The practical construction of a heat-measurer or *thermometer* on these principles, the various ways of graduating it, and how to convert the readings of one thermometer into those of another, are described in the article THERMOMETER. In the present article, we suppose the centigrade thermometer to be the one used,

If we make a number of thermometer tubes, fill them with different liquids, and graduate as in the centigrade, we shall find that, though they all give 0° in freezing, and 100° in boiling water, no two in general agree when placed in water between those states. *Hence the rate of expansion is not generally uniform for equal increments of heat.* It has been found, however, by very delicate experiments, which cannot be more than alluded to here, that mercury expands *nearly* uniformly for equal increments of temperature. However, what we sought was not an *absolute* standard, but a *reproducible* one; and mercury, in addition to furnishing this, may be assumed also to give us the ratios of different increments of temperature.

We must next look a little more closely into the nature of dilatation by heat. And first, of its *measure*. A metallic rod of length l at 0°, increases at $t°$ by a quantity which is proportional to t and to l. Hence k being some numerical quantity, the new length $l' = l(1 + kt)$. Here k is called the coefficient of linear dilatation. For instance, a brass rod of length 1 ft. at 0°, becomes at $t°$ $(1 + .0000187t)$ ft.; and here k, or the coefficient of linear dilatation for one degree (centigrade), is .0000187; or a brass rod has its length increased by about $\frac{1}{53{,}000}$th part for each degree of temperature.

If we consider a bar (of brass, for instance) whose length, breadth, and depth are l, b, d—then, when heated, these increase proportionally. Hence,

$$\begin{aligned} l' &= l(1 + kt), \\ b' &= b(1 + kt), \\ d' &= d(1 + kt); \end{aligned}$$

and therefore the volume of, or space occupied by, the bar increases from V or lbd to V' or $l'b'd'$.

$$\begin{aligned} \text{Hence } V' &= V(1 + kt)^3, \\ &= V(1 + 3kt) \text{ nearly, since } k \text{ is } \textit{very small}. \end{aligned}$$

Therefore we may write $V' = V(1 + Kt)$, where we shall have as before K, the coefficient of *cubical* dilatation for 1° of temperature. And, as $K = 3k$, we see that, for the same substance, the *coefficient of cubical dilatation is three times that of linear dilatation*.

In the following table, these coefficients are increased a hundredfold, as it gives the proportional increase of volume for a rise of temperature from 0° to 100° centigrade. It must also be remarked, that while the *linear* dilatation of solids is given, it is the cubical dilatation of liquids and gases which is always observed. Moreover, as the latter are always measured in glass, which itself dilates, the results are only *apparent;* they are too

small, and require correction for the cubical dilatation of glass. This, however, is comparatively very small, and may in general be neglected.

Glass	.00086	Water	.0466
Iron	.00122	Alcohol	.116
Zinc	.00294	Air	.3665
Mercury	.01543	Hydrogen	.3668

There is one remarkable exception to the law that bodies expand by heat—viz., that of water, under certain circumstances. From 0° (centigrade), at which it melts, it *contracts* as the heat is increased, up to about 4° C., after which it begins to expand like other bodies. We cannot here enter into speculations as to the cause of this very singular phenomenon, but we will say a few words about its practical utility. Water, then, is *densest* or *heaviest* at 4° C. Hence, in cold weather, as the surface-water of a lake cools to near 4°, it becomes heavier than the hotter water below, and sinks to the bottom. This goes on till the whole lake has the temperature 4°. As the cooling proceeds further, the water becomes *lighter*, and therefore remains on the surface till it is frozen. Did water not possess this property, a severe winter would freeze a lake *to the bottom*, and the heat of summer might be insufficient to remelt it all.

Specific Heat.—The thermometer indicates the *temperature* of a body, but gives us no direct information as to the *amount* of heat it contains. Yet this is measurable, for we may take as our UNIT the amount of heat required to raise a pound of water from 0° to 1°, which is of course a definite standard. As an instance of the question now raised—Is *more* heat (and if so, *how much more*) required to heat a pound of water from zero to 10°, than to heat a pound of mercury between the same limits? We find by experiment that bodies differ extensively in the amount of heat (measured in the units before mentioned) required to produce equal changes of temperature in them.

It is a result of experiment (sufficiently accurate for all ordinary purposes) that if equal weights of water at different temperatures be mixed, the temperature of the mixture will be the arithmetic mean of the original temperatures. From this it follows, with the same degree of approximation, that equal successive amounts of heat are required to raise the same mass of water through successive degrees of temperatures. As an instance, suppose one pound of water at 50° to be mixed with two pounds at 20°, the resulting temperature of the mixture is 30°; for the pound at 50° has lost 20°, while each of the other two pounds has gained 10°. Generally, if m pounds of water at t degrees be mixed with M pounds at T degrees (the latter being the colder), and if θ be the temperature of the mixture—the number of units lost by the first is $m(t-\theta)$, since *one* is lost for *each* pound which cools by *one* degree; and that gained by the second is $M(\theta-T)$, and these must be equal. Hence $m(t-\theta) = M(\theta-T)$, whence, at once,

$$\theta = \frac{mt + MT}{m + M};$$

But if we mix water and mercury at different temperatures, the resulting temperature is found *not* to agree with the above law. Hence it appears that *to raise equal weights of different bodies through the same number of degrees of temperature, requires different amounts of heat.* And we may then define the *specific heat* of a substance as the number of units of heat required to raise the temperature of *one* pound of it by *one* degree.

By the definition of a unit of heat, it is at once seen that the specific heat of water is unity; and, in general, the specific heats of other bodies are less, and are therefore to be expressed as proper fractions. For example, if equal weights of water and mercury be mixed, the first at 0°, the second at 100°, the resulting temperature will not be 50° (as it would have been had both bodies been water), but 3°.23 nearly—in other words, the amount of heat which raises the temperature of 1 pound of water 3°.2, is that which would raise that of 1 pound of mercury 96°.77, or the specific heat of mercury is $\frac{1}{30}$th of that of water. The following may be given as instances of the great differences which experiment has shown to exist among bodies in respect of specific heat: Water, 1.000; turpentine, .426; sulphur, .203; iron, .114; mercury, .033.

It is mainly to the great specific heat of water that we are indebted for the comparatively small amount of it required to cool a hot body dropped into it; for its comparatively small loss of temperature when it is poured into a cold vessel, and the enormous effects of the water of the ocean in modifying climate.

It has been found generally, with a few exceptions, that the specific heats of bodies are nearly *inversely* as their atomic weights (q.v.). *Hence all atoms require the same amount of heat to produce the same change in their temperature.* Thus, for simple bodies, we have atomic weight of mercury, 100 its specific heat, .033; product, 3.3; atomic weight of iron, 28; its specific heat, .114; product, 3.2. A similar remark may be made, it appears, with reference to compound bodies of the same type; but, in general, the product of the specific heat and the atomic weight differs from one type to another.

Latent Heat, Fusion, Solution, and Vaporization.—We are now prepared to consider the somewhat complex effects produced by heat on the molecular constitution of bodies; and, conversely, the relations of solidity, fluidity, etc., to heat. All bodies (except car-

bon, which has been *softened* only) have been melted, by the application of a proper amount of heat. The laws of this fusion are:

1. *Every body has a definite melting-point, assignable on the thermometric scale, if the pressure to which it is subjected be the same.*

2. *When a body is melting, it retains that fixed temperature however much heat may be applied, until the last particle is melted.* The last result is most remarkable. The heat applied does not raise the temperature, but *produces the change of state.* Hence it seemed to disappear, as far as the thermometer is concerned, and was therefore called *latent* heat.

A pound of water at 79° C. added to a pound of *water* at 0° C., produces, of course, 2 pounds of water at 39°.5. *But*, a pound of water at 79° C. added to a pound of *ice* at 0° C., produces 2 pounds of water at 0°. Heat, then, has *disappeared* in the production of a change from solidity to fluidity. And this we might expect from the conservation of energy (see FORCE), for actual energy in the shape of heat must be consumed in producing the potential energy of the molecular actions in the fluid. For every pound of ice melted, without change of temperature, 79 units of heat are thus converted into change of molecular arrangement.

We give a few instances of latent heat of fusion: Water (as above), 79.0; zinc, 28.1; sulphur, 9.4; lead, 5.4; mercury, 2.8.

In law 1, it is mentioned that constancy of pressure is necessary. In fact, the freezing (or melting) point of water is *lowered* by increase of pressure, while those of sulphur and wax are *raised;* but these effects, though extremely remarkable, are *very small.* Most bodies contract on solidifying; some, however, as water, cast-iron, type-metal, etc., *expand.* Thus, a severe frost setting in after copious rain splits rocks, etc., by the expansion of freezing water; and thus also we obtain in iron the most delicate and faithful copy of a mold, and in the fusible alloy a clear-cut copy of a type. The modern dynamical theory of heat enables us to see that a perpetual motion would be procurable, if bodies which contract on solidifying had *not* their melting point raised by pressure, and *vice versâ.*

Analogous to the fusion of a solid is its *solution* in a liquid, or the mutual conversion into liquids of two solids which are intimately mixed in powder. Here, also, we should expect actual energy in the shape of heat, to be used up in producing the potential energy of the fluid state; and, indeed, such is always the case. Such changes of arrangement destroy heat, or produce cold; but this in many cases is not the effect observed, as heat is generally developed by the *loss* of potential energy, if there be *chemical* action between the two substances. Hence in general, the observed effect will be the difference of the heat *generated* by chemical action, and that *absorbed* in change of state.

If a quantity of powdered nitrate of ammonia (a very soluble salt) be placed in a vessel, an equal weight of water added, and the whole stirred for a minute or two with a test-tube containing water, the heat required for the solution of the salt will be abstracted from all bodies in contact with the solution, and the water in the test-tube will be frozen. In this sense, the compound is called a *freezing mixture.* For additional illustrations of heat becoming latent, see FREEZING MIXTURE.

Of course the converse of this may be expected to hold, and latent heat to become sensible when a liquid becomes solid. As an example, when a saturated solution of sulphate of soda begins to deposit crystals of the salt, the temperature rises very considerably; and it is the disengagement of latent heat that renders the freezing of a pond a slow process, even after the whole of the water has been reduced nearly to the freezing-point.

Vaporization.—Almost all that has been said on the subject of fusion is true of vaporization, with the change of a word or two. Thus, however much heat we apply to a liquid, the temperature does not rise above the boiling-point. Heat, then, becomes *latent* in the act of vaporization, or rather is *converted into* change of state. It is found by experiment that 540 units of heat (each sufficient to heat a pound of water 1° C.) disappear in the conversion of a pound of water into steam. Hence a pound of steam at 100° C. is sufficient to raise 5.4 pounds of water from zero to the boiling-point.

Communication of Heat.—There are at least three distinct ways in which this occurs, and these we will take in order.

Conduction.—Why is it that if one end of a poker and of a glass or wooden rod be put into a fire, we can keep hold of the other end of the latter much longer than we can of the former? The reason is, that heat is more readily transmitted in the iron from particle to particle, than it is in glass or wood. This is conduction. It is to be noticed, however, that in this experiment a great portion of the heat which passes along each rod is given off into the air by the surface. The mathematical theory of conduction has been most exquisitely investigated by Fourier, and after him by Poisson, but on the supposition that the rate at which heat passes from a warmer to a colder portion of the body is proportional to the *difference* of temperature. As most of the experiments which have been made with the object of ascertaining the *conductivity* (*not* conductibility, the erroneous word in common use) of different bodies have been made in this way, it is not surprising that our knowledge on this point is very meager indeed. We know that silver conducts better than most other metals, and that the metals in general conduct better than other solids; but here our present information ends. It is satisfactory to know, however, that the defects of the old methods are now fully acknowledged, and that the important

element of conductivity will shortly be accurately known for all important substances. Forbes has recently shown that the conductivity of iron diminishes as its temperature increases; and the same is probably true of other bodies. This invalidates the conclusions of the mathematical theories above mentioned, but the necessary corrections will be easily applied when the experimental data are completely determined.

In conjunction with their radiating power (see next section), the conductivity of bodies is most important as regards their suitableness as articles of clothing for hot or cold climates, or as materials for building or furnishing dwelling-houses. We need but refer to the difference between linen and woolen clothing, or to the difference (in cold weather) of sensation between a carpet and a bare floor, in order to show how essential the greater or less conducting power of bodies is to our everyday comfort.

Radiation.—By this is understood the passage of heat, not from particle to particle of one body, but through air or vacuum, and even through solid bodies (in a manner, and with a velocity quite different from those of conduction) from one body to another. There can be no doubt whatever as to radiant heat being *identical* with light, differing from red light, for instance, as red light differs from blue; i.e., having (see LIGHT) longer waves than those corresponding to red light. This idea might easily have arisen during the contemplation of a body gradually heated. At first, it remains dark, giving off only rays of heat; as its temperature increases, it gives us, along with the heat, a low red light, which, by the increase of the temperature, is gradually accompanied by yellow, blue, etc. rays, and the incandescent body (a lime-ball, for instance) finally gives off a light as white as that of the sun, and which, therefore, contains all the colors of sunlight in their usual proportions. In fact (see FORCE), there is great reason to believe that the sun is merely a mass of incandescent melted matter, and that the radiations it emits, whether called heat or light, merely differ in *quality*, not in *kind*. Taking this view of the subject at the outset, it will be instructive to compare the properties of radiant heat with those of light throughout.

Light, then, *moves* (generally) *in straight lines*. This is easily verified in the case of heat by the use of the thermo-electric pile (q.v.) and its galvanometer. Placing the pile *out* of the line from a source of heat to an aperture in a screen, *no* effect is observed; but deflection of the needle at once occurs when the pile is placed in the line which light would have followed if substituted for the heat.

A concave mirror, which would bring rays of light proceeding from a given point to a focus at another given point, does the same with heat, the hot body being substituted for the luminous one, and the pile placed at the focus. Heat, then, is *reflected* according to the *same laws* as light. A burning lens gives a capital proof of the sun's heat and light being subject to the same laws of *refraction*. When the solar spectrum (q.v.) is formed by means of a prism of rock-salt (the reason for the choice of this material will afterwards appear), the thermo-electric pile proves the existence of heat in all the colored spaces, increasing, however, down to the red end of the spectrum, and attaining its maximum *beyond* the visible light, just as if heat were (as it *must* be) light with longer waves.

Some bodies, as glass, water, etc., transmit, when in thin plates, most of the light which falls on them; others, as wood, metal, colored glass, etc., transmit none or little. A plate of rock-salt, half an inch thick, transmits 96 per cent of the rays of heat which fall on it; while glass, even of a thickness of one-tenth of an inch, transmits very little. In this sense, rock-salt is said to be *diathermanous*, while glass is said to be adiathermanous, or only partially diathermanous. Most of the simple gases, such as oxygen, hydrogen, etc., and *mixtures* of these, such as air, oppose very little resistance to the passage of radiant heat, but the reverse is the case with compound gases. Some recent experiments by Tyndall seem to show that the vapor of water is exceedingly adiathermanous. The question, however, cannot be considered as finally settled, since some of Tyndall's results are so startling as to require further research and confirmation.

But there are other remarkable phenomena of radiant heat easily observed, which have their analogy in the case of light. 1. Unstained glass seems equally transparent to all kinds of light. Such is the case with rock-salt and heat. 2. Light which has passed through a blue glass (for instance) loses far less per cent. when it passes through a second plate of blue glass. Similarly, heat loses say 75 per cent in passing through *one* plate of crown-glass, and only 10 per cent of the remainder (say) in passing through a second. 3. Blue light passes easily through a *blue* glass, which almost entirely arrests red light. So dark heat passes far less easily through glass than bright heat does. These analogies, mostly due to Melloni, are very remarkable.

Again, light can be *doubly refracted, plane polarized, circularly polarized*. All these properties have been found in heat by principal Forbes (q.v.).

The beautiful investigations of Stokes and Kirchoff on the solar spectrum have shown us that bodies which most easily *absorb* light of a particular color, when heated, give off most freely light of that color; and it is easily shown by experiment, that those surfaces which absorb heat most readily also radiate it most readily. Thus, it was found by Leslie, that when a tinned-iron cube full of boiling water had one side polished, another roughened, a third covered with lampblack, etc., the polished side radiated little heat, the roughened, more, while the blackened side radiated a very great quantity indeed. And again, that if we have (say) three similar thermometers, and if the bulbs be (1) gilded, (2) covered

with roughened metal, (3) smoked, and all be exposed to the same radiation of heat, their sensibility will be in the order, 3, 2, 1. A practical illustration of this is seen in the fact, that a *blackened* kettle is that in which water is most speedily boiled, while a polished one keeps the water longest warm when removed from the fire. Again, if a willow-pattern plate be heated white-hot in the fire, and then examined in a dark room, the pattern will be reversed—a white pattern being seen on a dark ground. This experiment of Stewart's is very remarkable, and virtually constitutes an anticipation of Kirchoff's results leading to the explanation of the fixed lines in the spectrum (q. v.). It is this law of radiation and absorption that mainly gives rise to the superior comfort of white clothing to black in winter as well as in summer; radiating less in winter, it absorbs less in summer.

Much has been argued about the separate existence of *cold*, from such facts as these: A piece of ice held before the thermo-electric pile, produces an opposite deflection of the galvanometer to that due to a hot ball. If a freezing mixture be placed at one focus of a spheroidal mirror, and a thermometer with a blackened bulb at the conjugate focus, the latter will fall speedily, though very far off from the mixture. Now, the real explanation of such observations is to be found in what is called the "theory of exchanges," first enunciated by Prevost, and since greatly extended and carefully verified by Stewart, which is to this effect: "Every body is continually radiating heat in all directions, the amount radiated being (nearly) proportional to its own temperature." Hence the apparent radiation of cold in the experiments above mentioned is due to the fact of the pile or thermometer *radiating off more heat than it receives*, as its temperature is higher than that of the freezing mixture to which it is opposed. From this it is evident that any number of bodies left near each other, tend gradually to assume a common temperature. By this theory of exchanges, we explain the cold felt in sitting opposite a window in a frosty day, even when there is no draught.

Convection.—A hot body cools faster in a current of air than in a still atmosphere of the same temperature, evidently because fresh supplies of the colder air are continually brought into contact with it. It is by convection mainly that heat is conveyed from particle to particle in liquids and gases. Thus, when a lamp is applied to the bottom of a vessel of water, the heat does not diffuse itself in the water as it would (by conduction) in a mass of metal, but the expansion of the heated water at the bottom rendering it lighter, bulk for bulk, than the superincumbent fluid, causes it to rise to the surface; and thus, by convection, the heat is diffused throughout the mass. Conduction, properly so-called, can scarcely be shown, even if it really exist, in liquids or gases, on this account. The tremulous appearance of any object as seen by light which passes near a hot surface, as that of a boiler or a red-hot poker, is due to the convection of heat in the air, the warm current refracting light less than the cold air. See VENTILATION.

For the mechanical applications of heat, see STEAM-ENGINE, CALORIC-ENGINE, etc.

Sources of Heat.—They may be, so far as we know, ultimately reduced to two—chemical combination, and mechanical force; and, indeed, in all probability, the former is only a variety of the immensely different forms in which the latter is manifested. A more full examination of this point, and a general statement of the ultimate nature of the various sources of heat, will be found in the article FORCE above referred to. See also COMBUSTION, FUEL.

HEAT, *(ante.)*. The history of thermotics, the science of heat, from the earliest speculations to the most recent investigations, is full of interest. The ancients held notions in regard to it, which, although they lacked the precision which attends modern scientific investigation, were remarkable examples of the power of human reason to advance in the direction of truth unaided by anything except the inward light vouchsafed by the Creator. The medium of light and heat radiation, the cosmic or interstellar ether, which within the last century has been demonstrated to have an existence, was believed in by many of them. It was often the divine personification of cosmic material and also of force. In the Orphic hymns Æther is the soul of the universe and the author of all life. Anaxagoras, who taught that the sun was an inanimate fiery mass and not a deity, considered Æther to be the principle of fire or heat, and a half a century later Democritus, born about 460 B.C., taught that heat was produced by the efflux of extremely minute particles of matter, and moving with such velocity as to penetrate solid bodies; that some of these particles were infinitely small and from them the soul was formed. Plato had similar ideas, which may be found in his writings. Aristotle believed heat to be a condition of matter, and not a material substance, and his ideas were probably the first suggestions of a purely mechanical theory of heat. Twenty centuries later, Francis Bacon, 1561–1626, said in his *Novum Organum*, "Heat is a motion of expansion, not uniformly of the body together, but in the smaller parts of it; and at the same time checked, repelled, and beaten back, so that the body acquires a motion alternate, perpetually quivering, striving and struggling, and irritated by repercussion, whence springs the fury and fire of heat." Three-quarters of a century later, John Locke made a statement which approached still nearer the modern ideas on the subject. He says: "Heat is a very brisk agitation of the insensible parts of an object which produces in us that sensation from whence we denominate the object hot; so that what in our sensation is heat, in the object is nothing but motion." About the same

time, Huygens, in his *Tractatus de Lumine*, brought forward the undulatory theory of light, which contains many passages approaching much nearer than anything previously written, or for a century afterwards, to what may be called a scientific exposition of the laws of heat and light. He says: "It appears that light when gathered in the focus of a concave mirror, has the property of burning like fire, that is to say, it dissociates the particles of bodies, and this most certainly indicates motion, at least according to that philosophy wherein the causes of all natural effects are conceived by means of mechanical reasons." As a general statement of the doctrines of heat as a mode of motion this has not been put in much better words since his time. The doctrine of the actual convertibility of heat into mechanical force, which should stand as an equivalent, cannot be said to have been fairly started previous to the experiments of the American count Rumford. When at Munich superintending the manufacture of ordnance for the Bavarian government his mind was impressed with the great production of heat in boring cannon. By the use of a borer $\frac{5}{8}$ of an inch in diameter, applied with a pressure of 10,000 lbs. and a velocity of 32 revolutions per minute, sufficient heat was produced to raise 18 lbs of water from 60° to 212° F. in two hours and a half. The capacity of heat in the turnings having not changed, he concluded that the heat, whose source seemed to be inexhaustible, was the result of motion. Quantitative determinations, however, were necessary to demonstrate the correlations of heat and mechanical force, or heat and motion. These were furnished by the experiments of Dr. J. P. Joule of Manchester, England, and by Dr. J. R. Mayer of Hielbronn, Germany, which established what has been called the *mechanical equivalent of heat*. Joule's experiments were made in various ways. In one he employed paddle-wheels, which were made to revolve with a measured power in various liquids, whose specific gravities being known, the mechanical force could be compared with the amount of heat generated. Disks of metal were also revolved and forced against each other, the result in the evolution of heat being the same in all cases. He established the law which goes by the name of *Joule's equivalent*, or the *dynamical unit of heat*, viz.: that the fall of 772 lbs. through the space of one vertical foot affords a force sufficient to raise the temperature of water 1° F. In other words, the force given by the fall of 772 lbs. through one foot is equal to that generated by the elevation of 1 lb. of water 1° F. Dr. J. R. Mayer arrived at the same conclusions a year or two earlier by investigating the effects of the expansion and compression of gases, (see Mechanical Equivalent of Heat in *Correlation and Conservation of Forces*, N. Y., 1876. Boiling of Liquids, Diathermancy, Force, Rumford,) (*ante.*).

HEATH, *Erica*, a genus of small shrubs of the natural order *ericeæ* (q.v.), distinguished by a calyx of four leaves, a bell-shaped or ovate—often ventricose—corolla, and a 4-celled, 4-valved capsule, with dissepiments from the middle of the valves. The leaves are small, linear, and evergreen. The genus, as thus defined, has been broken down by some botanists into a number of genera, but the old name, *erica*, is still more commonly retained. The name heath, however, is, in popular language, extended to many plants of genera nearly allied to *erica;* and the little shrub which chiefly covers the large tracts named *moors* or *heaths* (Ger. *haide*) in Britain and on the continent of Europe is *calluna vulgaris*. The genus *calluna* has been separated from *erica*, chiefly on account of differences in the capsule, and of the presence of four bracts resembling an outer calyx. *C. vulgaris* the common Ling or Heather, is the only species known. It is found on arid places, and also in bogs. The flowers have much the appearance of being in spikes; they are of a lilac rose-color, rarely white. The various depth of color in the flowers of different plants adds much to the beauty of a hillside covered with heath in the end of Aug. The flowers afford abundance of honey, and bee-hives are therefore transported to the moors when the heather is in bloom. In bogs, it contributes much to the formation of peat. In some of the Hebrides, a decoction of heath is used for tanning leather. The plant is applied to various other uses in the Highlands of Scotland. Cottages are often thatched with it, and some of the poorest are mostly built of it, in layers with the roots inward, and mixed with earth and straw. Beds are also made of it, placed in a sloping direction, with the tops upwards, and are said to be very soft and elastic. Besoms and scrubbing-brushes are made of it. In the island of Islay, ale is made by brewing one part of malt and two of the young tops of heather; and this is supposed to be the same beverage which was anciently used by the Picts.—Of the genus *erica*, about 500 species are known; and these, with few exceptions, are natives of the s. of Africa. None are found in America. The British isles produce seven species, of which some have only been found in Ireland, and some in the s.w. of England, Cross-leaved Heath (*E. tetralix*) and Fine-leaved Heath (*E. cinerea*) are common plants in most parts of Britain, and like most of the genus, are very beautiful when in flower. The *heather-bells* of Scottish song are the flowers of one or both of these species. A sprig of *E. cinerea* was the badge of the Macdonalds at the time when they existed as a distinct clan. *E. Mediterranea* and *E. carnea*, common in the southern parts of Europe, are very frequent ornaments of British flower-borders, hardy plants, producing their flowers in great profusion in April. Many species, remarkable for the size and beauty of their flowers, are much cultivated in green-houses; and heath-houses are sometimes erected for the special purpose of their cultivation. Some of the south African or Cape heaths attain in their native region a much greater size than any European heath

except E. *arborea*, which in the Pyrenees sometimes grows to the height of twenty feet.

HEATH. The burning or setting fire maliciously to a heath in England is felony, and is punished by imprisonment for three years or less. The offense is technically called arson, being one of its varieties. In Scotland the offense is called muirburn (q.v).

HEATH, WILLIAM, 1737–1814; b. Mass. He commenced life as a farmer, but being fond of militia exercises he entered the ancient and honorable artillery company, occupying the position of chief officer in 1770. He was a representative in the provincial congress in 1774–75, and in 1776 was made a maj.gen. After the battle of Lexington he rendered good service in the pursuit of the British forces and in organizing the undisciplined men around Boston. He was in New York in 1776, and was one of the few officers who were opposed to evacuating the city. He continued in active and important service until the close of the war, when he went back to his farm. Afterwards he was state senator, probate judge, and was elected but declined the office of lieutenant-governor. His memoirs, written by himself, were published in 1798.

HEATHFIELD, Lord. See ELLIOTT, GEORGE AUGUSTUS.

HEATING. See WARMING and VENTILATION.

HEAVEN, in popular physical science, means the expanse which surrounds the earth, and which to a spectator on the earth's surface appears as a vast arch or vault, in which are seen the sun, moon, and stars. The earliest idea entertained of this expanse was of a solid vault or hemisphere with its concavity turned downwards (see FIRMAMENT).—In theology, the word "heaven" may be explained to mean that portion of the infinite space in which the Lord of all things, although present throughout all, is supposed to give more immediate manifestations of His glory. Of the belief in the existence of some such special scene of the presence of the Deity, most of the known religions of the world, ancient and modern, present abundant evidence. Aristotle declares that all men, whether Greeks or barbarians, have a conception of gods; and all agree in placing the habitation of the gods in the most elevated region of the universe. Plato is equally explicit. Even Epicurus teaches the same doctrine; and one of the treatises deciphered from the papyri of Herculaneum is a treatise by him, in which the position and the other characteristics of the habitation of the gods are minutely discussed. The same may be said of the Persian, the Egyptian, the German, the Scandinavian, and in general of all the ancient religions in which the belief of the existence of a supreme being assumes any other form than the pantheistic; and even in the pantheistic religions, although the philosophers may have adhered to the strict pantheistic view, and may have denied that any special locality could be regarded as the peculiar seat of the Deity, yet we find the popular belief and the popular worship even of such religions plainly founded upon the contrary supposition. In addition, however, to the idea of its being the special scene of God's glory, the word heaven also designates the place, or the state or condition, of the blessed spirits, and of the souls of just men who are admitted into the participation or the contemplation of the divine beatitude. In the religious system of the Greeks and Romans, none were supposed to be admitted to the heaven of the gods except the deified heroes or demigods; but with them the elysian fields of the lower world held, morally speaking, the same place in relation to the great doctrine of the divine retribution for the good and evil actions of human life. The elysium of the classic mythology is in all essential respects the natural equivalent of the heaven of the just. The Pythagorean doctrine of metempsychosis approached nearer to it in form, for it supposed that the soul, after the purification of successive transmigrations, was elevated to a higher and incorporeal condition in the cosmos. The doctrine of Plato was still more explicit. Although skepticism was rather the rule than the exception, it may be said in general that all the philosophical systems which included the belief of the immortality of the soul, also involved, at least in substance, the idea of a state of happiness as the reward of a virtuous life. The happiness, however, of the heaven of these various creeds differed widely from the spiritual delights of the heaven of revelation, each nation and each class forming to itself its own ideal of enjoyment. The delights of the classical elysium were, at all events in part, delights of sense. The German warrior had his war-horse and his armor laid in his grave, that he might be able to pursue, after death, the fierce enjoyments in which he had delighted while in the world of the living. The paradise of the Indian hunter is but a richer and more extensive hunting-ground. Still, not only these, but even the more groveling conceptions of the paradise of other races, must be regarded as a natural manifestation of the same instinct, or as a remnant, however overlaid by error and superstition, of the same primeval revelation upon which the scriptural notion of heaven is founded. Accommodating itself to the popular conceptions of the Jews, the biblical phraseology frequently implies the idea of the solid firmament already described; but the word, according to the common acceptation among Christians, is generally used simply to signify the abode of the Most High, and the special seat of His glory, in which the angels minister to Him, and the blessed spirits abide in perpetual praise and adoration. This abode of perfect bliss is believed to have been opened to the just after the

passion of our Lord and his ascension into heaven. Out of the just of the old dispensation, only Enoch and Elias were directly admitted to heaven; the patriarchs, the prophets, and in general the just, before the new dispensation, were detained in a preparatory abode, which the fathers call by the name *limbus patrum*, awaiting the coming of the common Redeemer. The common belief of Christians has been, that, since the coming of Christ, the just who are free from sin are admitted into heaven immediately after death. More than one controversy, however, has arisen on the subject; the most important of which are the Millenarian controversy (see MILLENNIUM), the Origenistic (see ORIGEN), and that on the question whether the just are admitted to the beatific vision of God immediately after death, or only after the general resurrection. The latter controversy arose out of the question as to the nature of the happiness of heaven, a discussion which would be out of place here. The Koran adopts the Cabalistic notion of seven heavens, which arise each above the other like the stages of a building; and it places the happiness of heaven in the enjoyments of sense. The Cabalistic writers divide these seven heavens according to the successive degrees of glory which they imply. The seventh is the abode of God and of the highest class of angels; the sixth, fifth, fourth, and third, are the successive abodes of the various grades of angels, arranged according to the degrees of dignity. The second is the region of the clouds, and the first the space between the clouds and the earth. One of the apocryphal books of the fifth c., *The Testament of the Twelve Patriarchs*, contains a very curious exposition of the same notion. See Fabricius, *Codd. Pseudep. Vet. Test.* i. p. 545.

HEBBEL, FRIEDRICH, a modern lyrical and dramatic poet of Germany, was b. at Wesselburen, in Ditmarsh, duchy of Holstein, Denmark, Mar. 18, 1813; studied at Heidelberg and Munich; and after traveling in France and Italy, settled at Vienna, where he married the actress Christine Enghaus in 1846. He died in 1863. His principal works are his *Gedichte* (2 vols. Hamb. 1842: Leip. 1848), remarkable both for their melody and beauty; and several dramas. Hebbel had a rich imagination, great power of thought, and an energetic and original style, but too great a predilection for the horrible and the exaggerated. His collected works appeared in 1865-68.—See Biography by Ruh (1877).

HE'BE, the goddess of youth, the daughter of Zeus and Here—according to others, of Here alone—was the wife of Hercules after he had been deified. She was the cupbearer in Olympus, before Zeus conferred that office upon Ganymede (q.v.); but she always retained the power of restoring the aged to the bloom of youth and beauty. According to Apollodorus, she became the mother of two sons by Hercules—Alexiares and Aniketos. In Homer she always appears as a virgin. In Athens altars were erected to her conjointly with Hercules. In Rome she was worshiped under the name of Juventas, and a temple in her honor existed on the Capitoline hill at the time of Servius Tullius. Statues of Hebe are extremely rare; she is to be recognized only by the drinking-cup.

HEBEL, JOHANN PETER, 1760–1826; b. Germany; studied at Erlangen, and in 1791 was professor in the gymnasium at Carlsruhe. In 1805 he was a church counselor, and in 1819 a prelate. He wrote many poems in the Swabian dialect which became so popular that he was called "the Burns of Germany."

HEBER, REGINALD, an English poet, and second bishop of Calcutta, was b. at Malpas, Cheshire, April 21, 1783. In 1800 he entered at Brasenose college, Oxford; and three years after produced his prize-poem *Palestine*, the only prize-poem perhaps which holds a place in English literature. In 1804 he became a fellow of All Souls. In 1807 he was inducted into the family-living at Hodnet, and entered upon his parochial duties with great zeal. He was a frequent contributor to the *Quarterly Review*, his political views being those of a tory and high churchman. In the course of 1812 he published a volume of *Hymns*. He was appointed Bampton lecturer in 1815, and two years after he received a stall in St. Asaph cathedral. He edited the works of Jeremy Taylor in 1819, and in 1822 he was elected preacher of Lincoln's Inn. Shortly afterwards the vacant see of Calcutta was offered to him, and after much hesitation on account of his wife and child, it was accepted, and he embarked for India on June 16, 1823. On his arrival, he entered upon his duties with exemplary zeal: and in June, 1824, he began the visitation of his diocese. He spent about 11 months visiting stations in Upper Bengal and the n. of Bombay. From April to Aug., 1825, he remained at Bombay, and sailed from thence to Calcutta, where he arrived on Oct. 21. In Feb., 1826, he proceeded to Madras on a visit to the southern provinces. He reached Trichinopoly on April 1, and on the 3d, after confirming 15 natives, and bestowing on them the Episcopal benediction, he entered a cold bath, in which, half an hour afterwards, he was found dead. The journal which he kept during his tour of visitation was originally published in three octavo volumes, and was afterwards reprinted in two volumes in Murray's *Home and Colonial Library*. His life was published by his widow in two volumes (Lond. 1830).

As a poet, his fame rests upon *Palestine* and his *Hymns* (new edition published by Murray in 1869). They have not much force or depth, but they are pleasingly versified, and are illuminated by graceful fancy. As a poet, he will be remembered; but as the most learned and zealous of Indian bishops, he is mainly enshrined in the affections of his countrymen.—RICHARD HEBER, half-brother of the preceding, was b. in Westmin-

ster in 1773, and died in 1833. He was a famous bibliomaniac. Having succeeded to large estates by the death of his father in 1804, he was enabled to indulge his elegant hobby to the utmost. Dr. Dibdin estimated his collection in England at 105,000 vols., in addition to which he possessed many thousands of books on the continent, the whole having cost him £180,000.

HEBERDEN, WILLIAM, 1710–1801; an English physician. In 1724 he was sent to St. John's college, Cambridge, where he obtained a fellowship about 1730, became master of arts in 1732, and took his degree in physic in 1739. He remained at Cambridge about ten years longer as a practitioner of physic, and gave an annual course of lectures on materia medica. In 1746 he became a fellow of the royal college of physicians in London; and afterwards establishing himself in London, was elected fellow of the royal society in 1769, and was employed in extensive practice for 30 years. In 1778 he was made an honorary member of the royal society of medicine at Paris.

HE'BERT, JACQUES RÉNÉ, commonly known as *Père Duchesne,* one of the most profligate characters of the French revolution, was b. at Alençon, in the year 1755. At an early age he went to Paris, and became a servant in one of the small theaters, but was dismissed for embezzling money. He then entered the service of a physician, but was soon dismissed for the same fault. At the commencement of the revolution, a person of the name of Lemaire, under the title of *Le Père Duchesne,* published a small popular paper for the diffusion of constitutional principles among the people. The success of this paper induced the Jacobins to establish another of the same name, and Hebert was appointed editor; and knowing the tastes of the class of people he addressed, he displayed such an exaggeration of principles and cynicism of language as ruined the enterprise of his honest rival. In consequence of the events of Aug. 10, he became a member of the revolutionary council, and played a conspicuous part in the horrors of Sept. He and his associates, called Hébertists or *Enragés,* were likewise mainly instrumental in converting the church of Notre Dame into a temple of reason. He was at length obliged to give way before the party of Robespierre, and perished on the scaffold on Mar. 24, 1794.

HE'BREWS [Heb. *Ibri*—either from Abraham, who came "from the other side" of Euphrates (*Eber, Ibr*), or from Eber, the great-grandson of Shem, and one of Abraham's ancestors] is the distinctive name of that branch of the Semitic family which migrated from Mesopotamia into Palestine, thence went to Egypt, and, after a long period of bondage, re-conquered Palestine, and finally settled there. Divided, at a later period, into two distinct states, that of Judah and of Israel, they were singly overcome, and led into exile. A portion, chiefly consisting of descendants of Judah (Jehudah), returned, and founded a new empire. From that time forward, all the members of the Mosaic commonwealth were known by the name of Jehudim, corrupted into Jews. A continuous sketch of their entire history from the days of Abraham to our own, as well as a brief outline of their language and literature, will be found under JEWS.

HEBREWS, EPISTLE TO THE, one of the epistles of the New Testament. Much discussion has arisen both as to its *canonicity* and *authorship,* the absence of the customary superscription rendering it impossible to attain certainty in regard to the latter, and naturally enough tending to throw doubt on the former also. In reference to the first and more important of these points, the canonicity, the case stands as follows: The earliest post-apostolic writer, Clemens Romanus, quotes from it in the same way, as from the other books admittedly canonical. Justin Martyr, Pinytus (?), the Cretan bishop, the predecessors of Clemens Alexandrinus and Origen, and the framers of the Peshito version of the New Testament, accept it as authoritative; while the Gnostic heretics, Basilides and Marcion, are spoken of as distinctly rejecting it. No disbelief of its canonicity is expressed by any section of the orthodox church until after the middle of the 2d c.—though many writers are silent altogether about it—after which period, for the next two centuries, the Roman and north African churches reject its authority. Tertullian speaks of it as a good sort of apocryphal book; Cyprian does not include it in Paul's epistles; Irenæus, even while defending the divinity of Christ, declines to strengthen his argument, which he could very effectively have done, by borrowing armor from its stores; while the Muratorian Fragment on the Canon, Caius, Hippolytus and Victorinus of Pannonia, also leave it out of the Pauline epistles. During the 4th c., however, its authority again began to revive, and it was received by Hilary of Poitiers, Ambrose of Milan, and later by Jerome, who, though frequently too hasty in his conclusions, was certainly the most learned and accomplished of the Latin fathers. The immense authority of Augustine was thrown into the same scale; others soon followed, and in 416 A.D., a decretal of pope Innocent III. placed its canonicity beyond cavil. In modern times, cardinal Cajetan, the opponent of Luther, reopened the ancient controversy. He rejected the authority of the epistle. The great reformer did the same, affirming that it was the work of some disciple of Paul's, who had not been thoroughly grounded in his master's teaching, and had built his own "wood, hay, and stubble," upon the apostle's "gold, silver, and precious stones." This opinion, however, met with small approval, and has never been adopted by any Protestant church.—*Authorship.* As we have already said, the author of the epistle is unknown, but is commonly supposed to be St. Paul. This appears to have been the opinion of the Eastern church from

the first; but the Alexandrian fathers—the most critical and scholarly of the early Christian theologians—struck with the entire dissimilarity of style, phraseology, and mode of thought which it presents to the Pauline epistles, and which is abundantly manifest even in the English version, sought to fix its authorship on some other person, Luke being the favorite. Tertullian, again, states that, according to the traditional belief of the north African school, Barnabas was the author. The Roman church, down to the middle of the 4th c., contented itself with a negative position, denying its Pauline authorship. The opinion of the Alexandrian school may be said to have prevailed, viz., that though Pauline in essence, the epistle was not Pauline in form. Thus the matter remained till the time of Luther, who suggested Apollos as the likeliest author. Since then the great majority of scholars, including many of the orthodox, have denied the Pauline authorship.

Who were the "Hebrews" to whom the epistle was sent, is also a matter of doubt; but the preponderance of probability is very strongly on the side of the church at Jerusalem, composed of those who were "Hebrews of the Hebrews." The date of the epistle can only be inferred from its contents. It must have been *before* the destruction of Jerusalem (70 A.D.), because the overthrow of the temple is not alluded to, which would have been one of the strongest links in the chain of argument to prove the temporary nature of the old national faith.

The purpose of the writer of the epistle is apparently to encourage the Jewish Christians of Jerusalem—perhaps of all Palestine—to persevere in the profession of their faith. In their own "Holy land," and in the perpetual presence of services that time had hallowed, and which were associated with all that was glorious and dear in their national history, they were apt at times to look back with a melancholy yearning on the past, and thus were often tempted to apostatize from motives which they hardly dared to condemn. The writer, conscious, it would seem, of the existence of this feeling, opens up with bold unflinching eloquence the whole question of Judaism *versus* Christianity; exhibits the contrast between the two with sharp, incisive analysis, strips the former of all its accidental and superstitious attractions, and shows that what is really deep and valuable in it is its *prophetic* character; it is but the shadow of a "better hope," viz., "the hope of the gospel;" and the great fathers and heroes of Judaism, from Abel downward, illustrate the truth of this, for "these all died in faith, not having received the promises, but having seen them afar off." But so vital and strong was their faith, that it may almost be said to have put them in spiritual possession of the realities to which they looked forward, for "faith is the *substance* of things hoped for, the *evidence* of things not seen." Thus they were "Christians before Christianity," and now that the things which they hoped for had come, the Jewish believers ought not to be grieved at parting with the old national worship, however dear, for the new worship really embraced the substance of the old, and thus bestowed upon it its own immortality. Such is, in the main, the course of thought. The style of the epistle in several passages is richly rhetorical.

HEB'RIDES, the name applied in a general sense to all the islands on the w. coast of Scotland. They have been variously classified; but the most natural division seems to be into the Outer and Inner Hebrides. To the Outer belong Lewis, with Harris, North Uist, Benbecula, South Uist, Barra, Coll, and Tiree. The remote isle of St. Kilda might be associated with this external series. The principal of the Inner islands are Skye, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Easdale, Colonsay, Jura, and Islay. Bute, the Cumbraes, and Arran, though lying in the firth of Clyde, are usually classed with the Hebrides. The whole are popularly spoken of as the Western isles, the term Hebrides being confined chiefly to literature.

The total number of the Hebrides is about 490 (which number includes every islet that affords sufficient pasturage to support one sheep), but of these not more than 120 are inhabited. The entire area is not accurately known, but has been estimated at upwards of 3,000 square miles, and the population, which is not increasing, was in 1871 about 100,000. Of the whole surface only about 200,000 acres are arable, the rest is in pasture-land of little value, and in morasses, peat-mosses, lakes, and barren sands and rocks. The scenery of Skye is grand and picturesque; Mull is noted for its lofty mountains, Jura for its peaks, and Arran for its high rugged hills. Islay and Bute are comparatively level and arable. Staffa is remarkable for its basaltic columns and great cavern. Iona derives interest from its ruins and historical associations. Politically, all the Hebridean isles are attached to Scotland, in the civil and ecclesiastical systems of which they participate. The counties among which they are distributed are those of Ross, Inverness, Argyle, and Bute. The principal Hebridean towns are Stornoway and Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute. Though situated on the mainland of Argyle, Oban is usually considered a town of the Hebrides, and along with Rothesay, is best known to tourists.

Enjoying the benefit of the Gulf stream (q.v.), the climate of the Hebrides is peculiarly mild. Snow seldom lies long on the sea-shores or low grounds, and in sheltered spots tender plants are not nipped by winter frosts. But if genial the climate is also humid. Drizzling rains are frequent, and mists often envelop the islands, or at least shroud the higher mountains from sight. With these drawbacks, the climate is pleasant

and healthful, and is recommended for certain classes of invalids. Partaking of the old Celtic character, the humbler class of natives for the most part speak Gaelic, but latterly, through educational efforts and otherwise, English has made extensive progress. As in the mainland portion of the Highlands, many large estates have passed from old families of note into the hands of opulent modern proprietors, by whom extensive improvements have been effected. The greatest improvement of all, however, and which deserves to be spoken of as the parent of all others, has been the work of a Glasgow firm, David Hutcheson & Co., by whom has been established an extraordinary system of steam-navigation in connection with the Hebrides calculated to develop the resources of the islands, and bring them, with the neighboring coast, within the sphere of trade and the reach of tourists. Originated by David Hutcheson, a person of singular energy and capacious views, the system of Hebridean steamers embraces several distinct lines of route in connection with Glasgow; and opening up remote tracts formerly reached only with extreme difficulty, may be said to be gradually altering the character of, and giving a new value to, the western Highlands and islands.

The Hebrides are the *Ebudæ* of Ptolemy, the *Hebudes* (of which the name Hebrides is merely a corruption, said to be the consequence of a misprint in a Parisian printing office) of Pliny, and the *Sudreyjar* (Southern Islands, as distinguished from *Orkneyjar*, Northern Islands), of the Norwegians. The latter epithet was Latinized into Sodorenses, and is still retained in the title "Bishop of Sodor and Man." The history of these islands forms an interesting episode in that of Scotland. According to the general account, the Hebrides were first colonized in the beginning of the 9th c. by emigrants from Norway, who had fled from the iron rule of Harald Haarfager (863–936); they naturally settled in the greatest numbers on the first land that was reached, viz., the Shetland and Orkney Isles and Outer Hebrides; but some wandered as far s. as the Isle of Man, colonizing as they went. The consequence of this was the total absorption of the Celtic into the Norse element in the northern islands, while southward the Celtic element asserted the predominance. This colony after a time threw off swarms, which settled on the n. and w. coasts of Scotland, Cumberland, and Westmoreland, and in all probability founded the Norwegian kingdoms of Dublin, Waterford, and Limerick; it also sent a colony to Iceland in 874. At last the settlers became so powerful as to be a source of annoyance to the mother-country, whereupon Harald Haarfager, about 870 A.D., fitted out a great expedition, and subdued the Hebrides and Man. They remained subject to Norway till 1266, three years after the battle of Largs, and were then transferred to Scotland. In 1346 one of the chiefs, named Macdonald, reduced the whole under his authority, and took the title of "Lord of the Isles;" but in 1540 they were finally annexed to the Scottish crown by James V. The Hebrides were ecclesiastically dependent on Norway as late as 1374, and prof. Munch argues that this relation lasted till 1472, when St. Andrews was made the seat of a metropolitan. The influx of the Norsemen has had here, as elsewhere, great influence over the nomenclature; many places and islands having lost their original Celtic designations.

The Hebrides have, from time to time, been visited by learned inquirers, among whom may be named Martin, sir Joseph Banks, Pennant, Dr. Samuel Johnson, and Dr. John Macculloch, who wrote a geological account of the islands (2 vols. 8vo. with a volume of plates, 4to. 1819). Scott's *Lord of the Isles* contributed materially to attach a popular interest to these islands, which, by the aid of Hutcheson's steam-fleet, are now within the compass of summer pleasure traveling. The more important islands of the Hebrides are described in separate articles. For the early history of the Hebrides consult *Chronica Regum Manniæ et Insularum*, edited from the MS. in the British museum, by P. A. Munch, prof. of history in the university of Christiania (Christiania, 1860).

HEBRIDES, NEW. See NEW HEBRIDES.

HE'BRON, one of the oldest cities in Palestine, belonging to the tribe of Judah, 21 m. S.S.W. of Jerusalem; it may even be regarded as one of the oldest in the world, for it was in existence in the time of Abraham, nearly 2,000 years before Christ. Hebron was anciently called Kirjatharba, i.e., city of Arba, from the progenitor of the *Anakim* (q.v.); at a later period it was the residence of king David, before he conquered Jerusalem; its subsequent history is unimportant.—The modern town is a poor place, inhabited by about 5,000 people, of whom about 50 families are Jews. It lies low down in a narrow and picturesque valley—the valley of Eschol, famous now, as of old, for its thick clustering grapes, its olives, and other fruits. The church erected by the empress Helena, the mother of Constantine, on the spot where Abraham is said to have been buried, has been converted into a mosque called *El-Haram*. The alleged tombs of the patriarch and of several members of his family are still shown. They are all richly hung with palls of green or red silk, which are renewed from time to time; but it is believed that the real tombs are in a "cave" below the building. The modern name of the town is *El-Khulîl* ("the friend," i.e., of God), in allusion to Abraham. About a mile from Hebron, rising solitarily in the midst of vineyards, beside a well of pure water, is one of the largest oak-trees in Palestine. It is 23 ft. in girth, and its foliage covers a space of about 90 ft. in diameter. Some say that this is the very tree beneath which Abraham pitched his tent; but this notion is untenable, for the tree itself gives

no evidence of such enormous antiquity; and, besides, Jerome speaks of Abraham's oak having disappeared about the time of Constantine.

HEBRUS. See MARITZA, *ante*.

HECATÆ'US, the son of Hegesander, famed as an historian and a geographer, flourished most probably about 500 B.C. There is great difference of opinion as to the time of his birth and of his death, but the best critics conclude that he was born about 550 B.C., and that he died about 476 B.C. He belonged to an ancient and wealthy family of Miletus, and was thus enabled to gratify his natural passion for knowledge and travel. He seems to have visited Greece, Thrace, the countries bordering on the Euxine, and many of the provinces of the Persian empire, with parts of Italy, Spain, and Africa. The results of his foreign travels and of his private studies were embodied in two great works—his *Tour of the World*, and his *Histories* or *Genealogies*. His geographical work was divided into two great portions, one treating of Europe, the other of Asia, Egypt, and Libya. He improved the map of the world which had been made by Anaximander. His *Histories* was little more than a prose version of the poetical legends of the Greeks—about Deucalion and his descendants—Heracles and the Heraclidæ—the Peloponnesian traditions—and those of Asia. Herodotus seems to have set considerable value on the writings of Hecatæus. The fragments of the works of Hecatæus have been edited by Creuzer, Klausen, and others.

But the most interesting part of the life of Hecatæus is that which succeeded his travels. In the revolt of the Ionians against Persia, his extensive knowledge of the Persian empire and its resources enabled him to give sound advice to Aristagoras, the ringleader of the insurrection, which, however, was rejected. He dissuaded his countrymen from an attempt so far above their means; when that counsel was despised, he urged the formation of a fleet, but without effect. After defeat had humbled the Ionians, and Aristagoras, with others, contemplated flight to Sardinia, he wished them (though in vain) to fortify the island of Leros, and wait there the course of events. He afterwards went as ambassador to the Persian satrap Artaphernes, and induced him to treat the Ionians with leniency.

HEC'ATÉ, an ancient Thracian goddess, afterwards adopted into the Greek pantheon, is first mentioned by Hesiod, who calls her the daughter of the Titan Perses, and of Asteria, or night. She was the only one of the Titans, under the rule of Zeus, who retained her former power. She appears on some occasions as the bestower of wealth, victory, wisdom, good-luck to sailors and hunters, and prosperity to youth, but able also to withhold these blessings. In connection with Persephone, she is described as a powerful infernal and cruel deity, who has all the magic powers of heaven, earth, and sea at her command. Particular honors were paid to her in Bœotia, at Ægina, and even in the Eleusinian mysteries. She played an important part in the mysteries of the Cabiri, which were celebrated principally at Samothrace and Lemnos. Her sanctuary in Samothrace was the Zerynthian cave, and wherever she was worshiped along with the Cabiri, her temple was placed near a cave. As the bestower of good and averter of evil, her image was placed before the houses of persons of rank, in places of popular assembly, and at crossways, where at every new moon offerings of food were presented to her, which were consumed by poor people. As an infernal goddess, she appears in a hideous form. Serpents issue from her feet, serpents are twined in her hair, she bears a lighted torch and a sword in her hand, and two black shaggy dogs are her attendants; and sometimes she is represented with three heads, viz., those of a horse, a lion, and a dog. In this last form she appears at the crossways. There is another important feature, which arose from the notion of her being an infernal divinity, viz., the belief in her being a spectral being, who at night sent from the lower world all kinds of demons and terrible phantoms, who taught sorcery and witchcraft, and dwelt at cross-roads, tombs, and near places where murder had been committed.

HEC'ATOMB (Gr. *hecaton* and *bous*), in the worship of the Greeks, and in other ancient religions, means a sacrifice of a large number of victims, properly, although by no means necessarily, one hundred. Originally, it would seem that the practice was to burn the entire victim; but even as early as the time of Homer, it was usual only to burn the legs wrapped up in the fat and certain parts of the intestines. The rest of the victim was consumed at the festive meal which succeeded the sacrifice. Besides, therefore, that the gods were believed to be propitiated in proportion to the number of victims, the increase of the number was also gratifying, not alone to the priests and servants of the temple, but also to the public, who were admitted to the sacrificial banquet. Hence in Athens the hecatomb was a most popular form of sacrifice (Athenæus, i. p. 3). On the contrary, the thrifty Spartans limited the number both of the victims and of the sacrifices; and while the other Greek states required that the victim should be of the most perfect kind, the Spartans were content with animals of a very inferior character. In the hecatomb, strictly so called, the sacrifice was supposed to consist of one hundred bulls; but other animals were frequently substituted.

HECK, BARBARA, 1734-1804; b. Ireland, of German parents, in a district which early felt the influence of Wesley's preaching. She and her husband Paul came to America with Philip Embury in 1760, and in 1766 they organized a Methodist society

in Embury's house in New York city. This led to the famous old John street Methodist chapel. With Embury she was instrumental in founding other societies in northern New York and Canada.

HECKER, FRIEDRICH KARL FRANZ, a leader of the democratic party in the German revolution of 1848, was b. at Eichtersheim, Baden, Sept. 28, 1811, and after studying law in Heidelberg, became in 1838 advocate of the supreme court in Mannheim. Though rising to eminence as a pleader, when elected in 1842 a member of the second chamber in Baden, he abandoned his profession for political life, and soon grew popular among the more advanced sections of the opposition. In 1846 he began to side actively with the purely democratic and socialistic party outside of the chamber, and on the revolution breaking out in 1848, immediately began to employ his eloquence in revolutionary agitation. When the preliminary convention (*das vorparlament*) met, he endeavored, with the influence of his whole party, to constitute it into a permanent republican assembly. The frustration of this effort led him to think of surprising the smaller governments of southern Germany with the artisan bands which had been sent to the Rhine. Defeated at Kandern, April 20, 1849, he fled into the canton of Basel, where he conducted a newspaper against the constitutional party. On being refused admission into the parliament, though elected to represent Thiengen, he emigrated to America, where he had bought a farm. The Baden revolution (1849) brought him back to Europe, but finding the revolution over on arrival, he returned to America. He took an active part in the war of secession.

HECKER, ISAAC THOMAS, b. N. Y., 1819. About 1843 he became interested in socialistic communities at Brook farm and at Fruitlands, Mass. In 1845 he joined the Roman Catholic church, and in 1849 (in England) was ordained a priest. He joined the Redemptorists, but with others was released from his vows, and founded the congregation of St. Paul the apostle, or Paulists. In 1865 he established in New York *The Catholic World*. He was present, as procurator of bishop Rosecrans, at the Vatican council in 1869, and in 1873 traveled extensively in Europe and the east. He is the author of *Questions of the Soul*, and *Aspirations of Nature*.

HECKEWELDER, JOHN, 1743–1823, b. England, accompanied his parents at 12 years of age to Pennsylvania, and in 1771 became a Moravian missionary among the Indian tribes along the Ohio. After laboring 40 years he retired and passed the remainder of his life at the Moravian village of Bethlehem, Penn. He wrote a valuable *History of the Manners and Customs of the Indian Nations*, and a narrative of his missionary work.

HECKLES, or HACKLES, and **GILLS**. These are very important parts of various machines, employed in the preparation of animal and vegetable fibers for spinning. They consist of a series of long metallic teeth, through which the material is drawn, so that the fibers may be combed out straight, and so fitted for the subsequent operations. The manufacture of heckles and gills involves great care and nicety, as any imperfection may cause great loss, by damaging the fiber which passes through them. For flax, hemp, jute, and similar large and coarse fibers, the teeth of the heckles are large, being about eight inches long, and made of steel wire one-fourth of an inch in diameter. This is gradually reduced from the base upwards, until it ends in a fine point. The whole is beautifully polished, so as to prevent injurious friction. They are fixed in a wooden or metallic base, in several rows, alternating with each other at short distances apart, in heckles; but in gills the teeth are much finer, resembling needles, and fewer in number, being placed usually in two rows; they constitute a part of the spinning machinery. The manufacture of these articles is a special trade; the manufacturers are called heckmakers.

HECKMONDWIKE, a thriving manufacturing village of England, in the West Riding of Yorkshire, is situated on the Lancashire and Yorkshire railway, 3 m. n.w. of Dewsbury, and 10 m. s.w. of Leeds. It is the chief seat of the carpet and blanket trades in the West Riding. Pop, '71, 8,300.

HEC'LA, or HEKLA, a volcanic mountain in Iceland, is of a conical shape, and stands isolated about 20 m. from the s.w. coast. Its snow-clad summit is 5,110 ft. high. The principal crater, when visited by sir George Mackenzie, was about 100 ft. deep, and contained a large quantity of snow in the bottom. There are many small secondary craters near the summit. The sides of the mountain are broken by numerous deep ravines, forming channels for mountain torrents that are produced by the melting of the snow. The principal rocks are lava and basalt, covered with the loose stones, scoriæ, and ashes ejected from the volcano. The view from the summit is very desolate and wild. "Fantastic groups of hills, craters, and lava, leading the eye to distant snow-covered jokuls; the mist rising from a waterfall; lakes embosomed amid bare, bleak mountains; an awful and profound slumber; lowering clouds; marks all around of the furious action of the most destructive of the elements, give to the region a character of desolation scarcely to be paralleled."

A record of the eruptions has been kept since the 10th century. They are few in number, only 43, but they have been always very violent, and generally continuing for a considerable time. One of the most tremendous occurred in 1783, when the immense

quantity of lava and ashes ejected laid waste a large extent of country. The internal fire remained, as if exhausted, in a quiescent state till Sept., 1845, when with terrific energy it again burst forth, and continued active for more than a year. At this time it poured out a torrent of lava, which at the distance of two miles from the crater was one mile wide, and from 40 to 50 ft. deep. A fine dust from this eruption was scattered over the Orkney islands, a distance of 400 miles from Hecla.

HECTARE. See ARE. *ante* METRIC SYSTEM.

HEC'TIC FEVER (Gr. *hektikos*, habitual), (see FEVER). a peculiar type of feverish disease, usually found associated with organic disease of the chest or abdomen, and above all with tubercular disease, or consumption (q.v.). It can scarcely be called an independent form of disease, although carefully described as such by most of the older authors, and distinguished as a fever with morning and evening paroxysms, and intermediate remissions. Generally speaking, the evening paroxysm is the more marked; the patient becomes flushed after eating, or in the excitement of conversation; there is a preternatural vividness of expression, which, with the heightened color, sometimes gives a very fallacious impression of health. The patient retires to bed, has tossing and uneasy sleep, and wakens in the middle of the night, or towards early morning, bathed in cold perspiration, and in a state of extreme languor. Next day, the whole of these changes are repeated, and under the slow but too sure progress of the fever, the patient gradually emaciates, and in the end dies exhausted. The treatment of hectic fever is substantially that of consumption (q.v.).

HECTOGRAM. See METRIC SYSTEM.

HECTOLITER. See METRIC SYSTEM.

HECTOMETER. See METRIC SYSTEM.

HECTOR, the bravest hero in the Trojan army, was the son of king Priam and Hecuba, and married Andromache, the daughter of Eëtion, king of Thebes, in Cilicia, by whom he became the father of Astyanax of Scamandrius, and, as some say, likewise of Laodamas. His exploits are sung by Homer in the *Iliad*. Hector having slain Patroclus, the friend of Achilles, the latter, forgetting his quarrel with Agamemnon, took up arms to avenge his beloved companion, and Hector fell by his hand. His body was dragged in triumph by the conqueror round the tomb of Patroclus, but was afterwards ransomed by Priam, who caused it to buried with great pomp. In Ilium, Hector was honored as a hero, and sacrifices were offered to him. In compliance with an oracle, his bones are said to have been subsequently conveyed to Thebes, in Bœotia. Hector is incontestably the greatest hero in the *Iliad*. Yielding in valor to none, he is defeated by Achilles, not because the latter surpasses him in courage, but because, already wounded and exhausted with prolonged conflicts, he undertakes a single combat, trusting to the aid of Deiphobus. Minerva assumes the form of the latter, and Hector is deceived and forsaken. In humanity, he is superior to all. One of the most beautiful episodes in the *Iliad* is that in which Hector takes leave of his wife Andromache, and expresses his feelings as a husband, a father, and a prince.

HEC'UBA (Gr. *Hekăbe*), the second wife of Priam, king of Troy. During the Trojan war, she witnessed the destruction of all her sons, with the exception of Helenus, and at last saw her husband murdered before her eyes by the savage Pyrrhus. After the destruction of Troy, she fell into the hands of the Greeks as a slave, and, according to one form of the legend, threw herself in despair into the sea. Euripides (in his tragedy of *Hecabe*) and other ancient tragedians describe her as a tender mother, a noble princess, and a virtuous wife, exposed by fate to the most cruel sufferings. In sculpture she is represented as a matron, whose face, furrowed by grief, betrays a character naturally ardent and passionate.

HEDDING, ELIJAH, D.D., 1780–1852; b. N. Y. At the the age of 18 he joined the Methodist church and begun work as an itinerant preacher in Vermont and Canada. In 1803 he was sent to New Hampshire, and in 1807–9 was presiding elder of the New Hampshire and New London districts. From 1809 to 1824 he preached chiefly in Massachusetts. In the latter year he was chosen bishop, and in 1848 represented the church in the British conference. He was one of the founders of *Zion's Herald*, the first Methodist paper in the country. His *Manual of Discipline* is highly valued.

HEDGE (Sax. *hege*, Ger. *hag*, Fr. *haie*; in Ger., *hegen* is to fence, protect, cherish), a fence formed generally of growing shrubs. Hedges are very much used in some parts of the world, whilst others, equally cultivated, are almost destitute of them. Thus, whilst they are very common in many parts of Britain and of Italy, they are comparatively rare in France and Germany. For many situations, they are particularly adapted, owing to the protection which they afford from high winds; and the height to which they are permitted to grow ought to be accommodated to the requirements of the locality in this respect. They are also much more pleasant to the eye than dry stone walls or coarse palings; but there can be no doubt that where neither shelter nor ornament is intended, they cause great waste of land; as even when very trimly kept, they occupy a much more considerable breadth than other fences, and their roots draw nutriment from the soil on each side to a very considerable distance. It has been calculated that

even such reduction of the breadth occupied by hedges as might be accomplished by moderate care in trimming, would add to the extent of land available for crops in England as much as a middling-sized county.

Hedges in Britain are generally formed of hawthorn (q.v.). The unsightly blanks in hawthorn-hedges, which are also injurious to their usefulness, are not easily filled up with hawthorn-plants, but in such circumstances, the barberry grows well, and is sometimes used with great advantage. Hedges are also sometimes formed of barberry itself. See BARBERRY. Beech-hedges are very common around gardens and pleasure-grounds, and a hedge of beech and hawthorn mixed is common in many places. Beech-hedges, closely trimmed, can be made almost as impervious as any kind of hedge known in Britain; and where shelter is needed, can easily be trained to a height of twenty feet or upwards. Holly makes an excellent, ornamental hedge, much in use for gardens and pleasure-grounds. Ornamental hedges are sometimes formed of yew, hornbeam, lime, and other trees, which can scarcely, however, be reckoned among hedge-plants. Privet is much used for ornamental hedges, but they are of little use as fences.

Hedges were in use among the ancient Romans, chiefly for the inclosure of vineyards and gardens. It is probable that they have existed in England since the times of the Romans, although not very common till the end of the 17th c.; but they are supposed to have been first introduced into Scotland and Ireland by the officers of Cromwell's armies. The first hedges planted in Scotland are said to have been at Inch-Buckling Brae, in East Lothian, and at the head of loch Tay, and that at the former place existed as a row of old hawthorns in the beginning of the present century.

HEDGE, FREDERICK HENRY, D.D., b. Mass., 1805; son of Levi, the professor of logic and metaphysics in Harvard college. In 1818 he accompanied George Bancroft to Germany, where he studied nearly five years. He returned in 1823, and two years later graduated at Harvard. The next three years were passed in the study of theology, and in 1828 he was settled in the Unitarian ministry at West Cambridge. Afterwards, he was pastor at Bangor, Me.; Providence, R.I.; and Brookline, Mass. He traveled in Europe in 1847–48. In 1857 he was made professor of ecclesiastical history in the Cambridge theological school. In the same year he edited the *Christian Examiner*, a Unitarian journal, and in 1859 was president of the American Unitarian association. In 1872 he was appointed professor of German in Harvard college, where he now remains. He has published *The Prose Writers of Germany; Liturgy for the use of the Church; Reason in Religion; Primeval World of Hebrew Tradition;* and many translations from German poets.

HEDGEBOTE, in English law, means the right of a tenant to cut wood on the farm or land, to repair the hedges or fences.

HEDGEHOG, *Erinaceus*, a genus of insectivorous quadrupeds, the type of the family *erinaceidæ*. The muzzle is rather elongated, the neck short, the limbs short, the feet five-toed, the claws strong, the tail short, the body covered on the upper parts with sharp spines and with hair below, and capable of being rolled up into a ball by means of a powerful muscle extended under the skin. The teeth are 36 in number, 20 in the upper jaw and 16 in the lower, but considerable difference of opinion has existed among naturalists as to the character of some of them. The middle incisors are very long, and stand forward; those of the upper jaw are widely separated; the lateral ones small. Like many other *insectivora*, hedgehogs are by no means limited to insect food, but prey on larger animals, as reptiles, small quadrupeds, and birds; they are fond of eggs and of milk, and in confinement will readily eat soaked bread, cooked vegetables, or porridge. Their power of rolling themselves into a ball, from which the spines project on every side, is their means of protection from enemies. The spines are curiously bent near the root, and so set, that on the contraction of the muscle by which the animal rolls itself up, they are held firmly in their position, their points towards the adversary. They are very strong and sharp; their elasticity is also so very great, that the animal can sustain falls from great heights without apparent injury.

The COMMON HEDGEHOG (*E. Europæus*) is a native of Britain and of most parts of Europe. A particular description is unnecessary. Its short ears are one of its distinctive specific characters. It is seldom above 9½ in. in length. Its spines are about an inch long. It readily kills snakes, and even vipers, which it eats, beginning always at the tail. It is said to be capable of resisting in an extraordinary degree not only the venom of serpents, but other kinds of poison, however administered. A hedgehog has been known to eat great numbers of cantharides (Spanish flies) without injury, although one would have caused great agony to a dog. It brings forth from two to four young at a birth, and provides for the occasion a curiously constructed nest, of which the roof is capable of throwing off the rain, so as to keep them dry. The young are blind at first; their ears are also closed—a thing as unusual as the former is common among animals—their bodies are covered with soft incipient spines. In winter the hedgehog becomes torpid, retiring to some hole at the base of a tree, beneath roots, or in some such situation. It provides no winter store, and no other British animal hibernates so completely.—The hedgehog is easily tamed, becomes very familiar, and is very useful in houses where *black beetles* are troublesome. Night is its period of activity.—The flesh of the hedgehog is eaten in some parts of Europe, but in Britain only by gypsies, who

roll it up in a ball of clay, and so roast it.—Other species of hedgehogs are found in different parts of Asia and Africa.

HEDGEHOG PLANT, a name given to those species of medick (*medicago*) which have the pods spirally twisted and rolled up into a ball, beset with spines. The peculiar appearance of the pods makes them objects of interest, on which account they sometimes find a place on flower-borders: and like the other medicks (q.v.) they are useful in the countries in which they abound, as affording excellent food for sheep and cattle. They are particularly plentiful on sandy grounds near the sea in some parts of South America, and their pods are too plentiful in the South American wool imported into Britain.

HEDGE-MUSTARD, *Sisymbrium*, a genus of plants of the natural order *cruciferæ*, mostly annual or perennial herbaceous plants, with very various foliage, some yellow or white flowers, and a long roundish or 6-angled pod (silique). Several species are natives of Britain, of which one, the COMMON H. (*S. officinale*), was once employed in medicine for catarrhs and other ailments. It is said to be diaphoretic and expectorant. It has a mild pungency. It is sometimes cultivated as a pot-herb. It is an annual plant, plentiful in waste places and by waysides, sometimes 2 ft. high, branched, with runcinate or deeply-lobed leaves, stem and leaves hairy, flowers very small and yellow. The pods are erect, and closely pressed to the stalk.—BROAD-LEAVED H., or LONDON ROCKET (*S. irio*), is said to have sprung up in great abundance on the ground desolated by the fire of London in 1666.—FINE-LEAVED H., or FLIX-WEED (*S. Sophia*), is common in many parts of England and Scotland, growing in waste places. Its leaves are doubly or trebly pinnatifid. It is about 2 ft. high, branched, with yellow flowers. It was formerly administered in dysentery and hysteria, and the seeds as a vermifuge.

HEDGE-SPARROW, HEDGE-WARBLER, HEDGE-ACCENTOR, or DUNNOCK, *Accentor modularis*, a little bird of the family *sylviadæ*, a common native of Britain and of most parts of Europe. It is not quite so large as the house-sparrow, which it somewhat resembles in dull brownish plumage, but, notwithstanding its most common name, in little else; its slenderness of bill, and its whole form, proclaiming it at once to be of a different family. It feeds principally on insects. It is one of the earliest spring songsters, having a sweet plaintive song; and the nest is one of the first that the school-boy finds in spring. The nest, of green moss, roots, and wool, lined with hair, is usually placed rather low in a bush or hedge. The eggs are four or five in number, of a delicate and spotless bluish green. The cuckoo very often lays its egg in the hedge-sparrow's nest. The hedge-sparrow is chiefly found in summer, in the northern temperate parts of Europe, migrating southward in winter; but in Britain it remains all the year. —Another species of the same genus, the ALPINE WARBLER, or ALPINE ACCENTOR (*A. Alpinus*), a rather larger bird, lighter and rather more varied in color, has in a few instances been found in Britain. It is common in the Alps, and other mountains of France, Germany, and Italy.—Other species of accentor are found both in the Old and New World. They are all of dull plumage. In this genus the bill is more conical than in the other *sylviadæ*.

HEDJAZ (the land of pilgrimage), a maritime province of Arabia, extending along the eastern shore of the Red sea, and bounded on the n. by the Syrian desert and the gulf of Akaba, on the e. by the province of Nedjed, and on the s. by that of Yemen. It is almost entirely unproductive, being chiefly sandy or stony. Containing the two sacred cities, Mecca and Medina—the former the birthplace of Mohammed, the latter the place in which he is interred—Hedjaz is the "holy land" of Arabia. It is traversed annually by vast numbers of pilgrims.

HEDJRAH (*Hegirah*), or, more fully, HEDJRAT AL-NABI, Arab. emigration (not *flight*, as commonly translated) of Mohammed (q.v.). The tribe of the Koreish having resolved to slay the new prophet, their kinsman, he secretly left Mecca on Sept. 13, 622 A.D., and repaired to Medina, where, partly from a feeling of jealousy towards Mecca, partly because his new doctrine had already found here many new adherents, he was so well received and so vigorously supported in the wars which he now began to wage against his adversaries, that the rise and progress of Mohammedanism was said to date in reality from the time of Mohammed's leaving Mecca. The Hedjrah, therefore, was made the starting-point of a new era—the Mohammedan (Tarikh Alhijrah)—by Caliph Omar, who, 639 or 640, with the aid of a Persian, Harmozan, instituted the new Moslem calendar. It does not, however, as is generally supposed, begin from the day of the flight itself, but from the first of the Moharram (the first month of the year) preceding it—a date corresponding to our July 15 or 16, 622 A.D.

The Mohammedan year, as a lunar year, is shorter than ours by 10 days 21 hours and $14\frac{3}{5}$ seconds; and this circumstance renders the exact transfer of Mohammedan dates into dates of our own calendar a very difficult task. An elaborate method has been invented for that purpose by Ideler; an easy, although not minutely accurate way of finding the year, but not the month and the day, is by the deduction of 3 per cent from the given Mohammedan year, and the addition of 622 to the sum so obtained; e.g., the year of the Hedjrah corresponding to 1862 A.D. being 1279, deduct 3 per cent, or about 39 = 1240, add 622 = 1862.

HEEM, JAN DAVID DE, the most celebrated painter of what is called "still-life" that the Dutch school has produced, was b. at Utrecht in 1600, studied under his father, and soon obtained immense sums for his pictures. Towards the close of his life he removed to Antwerp, where he died in 1674. Heem's pictures represent, for the most part, splendid vases of fruits and flowers, musical instruments, and ornaments of various kinds. He painted a garland of flowers for a certain Jan Vander Meer, who refused 2000 guilders for it, but afterwards gave it to the Prince of Orange, who brought it with him to England. Heem's coloring is exquisite, and his use of *chiaroscuro* unsurpassable.

HEEN, CHOW, TING, AND **FOO,** Chinese geographical terms, used to designate the relative rank of cities and districts. *Heen* indicates the smallest division, although its city may be an important one; thus, Shanghai-heen is a large city and district, while the department in which it is situated, Sungkiang-*foo*, to which it is subordinate, is a smaller place. Generally speaking, however, the terms designate the rank of cities, from *foo*, the chief, to *heen*, the least in size.

HEEREN, ARNOLD HERMANN LUDWIG, an eminent German scholar, was b. Oct. 25, 1760, at Arbergen, near Bremen, where his father was at that time pastor, and received his education at the cathedral school of Bremen, and at the university of Göttingen. He first made himself known to the literary world by two philological works—viz., an edition of Menander's *De Encomiis* (Göttingen, 1785), and the *Eclogæ Physicæ et Ethicæ* of Stobaeus (4 vols. Göttingen, 1792–1801). In preparing materials for the latter of these works, he visited Italy, the Netherlands, and France, and by intercourse with various learned men of these countries, expanded and enriched his mind. In 1794 he was appointed professor of philosophy, and in 1801, professor of history at Göttingen. He married in 1797 a daughter of Heyne, and died Mar. 7, 1842. His lectures in the university referred, from the very first, more to Greek and Roman antiquities, and to the history of the fine arts, than to philology, strictly so called. The latter, indeed, was finally quite thrown into the background. In 1793–96 appeared at Göttingen his *Ideen über Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (4th edit. 5 vols. 1824–26). This work has secured him a place among the most eminent modern historians. If his *Geschichte des Studiums der classichen Literatur seit dem Wiederaufleben der Wissenschaften* (2 vols. Gött. 1797–1802) proved less satisfactory to scholars, his *Geschichte der Staaten des Alterthums* (Gött. 1799; 5th edit. 1826), and his *Geschichte des Europ. Staatensystems und seiner Colonien* (Gött. 1809; 4th edit. 1822) abounded in new views and acute expositions. For his *Untersuchungen über die Kreuzzüge*, he received the prize from the National institute of France. His *Kleine historische Schriften* (3 vols. Gött. 1803–08) contain some very interesting treatises. In 1821–26 he published an edition of all his historical works (*Historischen Werke*) in 15 vols. Heeren was a member of the academies of St. Petersburg, Berlin, Munich, Stockholm, Dublin, and Copenhagen, and of the Asiatic societies of London and Calcutta.

HEFELE, KARL JOSEPH VON, D.D., b. Würtemberg 1809; graduated at Tübingen, and in 1840 received a professorship in the Catholic theological faculty, where he represented the departments of church history, Christian archæology, and patrology. In 1838 he became doctor of divinity, and afterwards knight of the order of the Würtemberg crown. From 1842 to 1845 he was a member of the Würtemberg chamber of deputies. He was consecrated bishop of Rottenberg in 1869, and took part in the Vatican council. In 1874 he declined the archbishopric of Freiburg offered to him by the Baden government on the ground that he could not take the oath which was demanded from the bishops in Prussia and Baden. His most important work of research is the *History of Councils*, based on the study of original materials. It has been translated into English under the title of *A History of the Christian Councils, from the Original Documents, to the close of the Council of Nicæa*, A.D. 325. Among other works are *The Introduction of Christianity into South-Western Germany, Cardinal Ximenes and the Ecclesiastical Condition of Spain in the Fifteenth Century*, and *Contributions to Church History, Archæology, and Liturgy*. He has also published a *Selection of the Homilies of Chrysostom* in a German translation, and an edition of the works of the apostolic fathers. An English translation by the Rev. Canon Dalton, of his *Life of Ximenes*, appeared in 1860.

HEGEL, GEORG WILHELM FRIEDRICH, one of the greatest German philosophers, was b. Aug. 27, 1770, at Stuttgart, and became, in 1788, a student in the Tübingen theological institute, where his speculative abilities, however, were outshone by his younger companion, Schelling. After leaving the university in 1793, he was a family tutor at Bern and Frankfort-on-the-Main for six years, during which period he devoted himself chiefly to the study of Christ's life and the philosophy of religion. In the beginning of 1801 he left Frankfort for Jena, where he published his first work, *Ueber d. Differenz d. Fichte'schen u. Schelling'schen Systems* (1801), and entered the university as *privat-docent*. Next year, he joined Schelling, to whose philosophy he seems at this time to have adhered, in the editorship of *Das Kritische Journal für Philosophie*. His lectures in Jena did not attract much notice, but it was at this place, while the din of the battle in 1806 was sounding through the town, that he completed his first important work, *Die Phänomenologie d. Geistes* (1807), which he used afterwards to call his voyage of discovery. Shortly before the battle, he had been made extraordinary professor of

philosophy; but the disaster which that event brought upon Jena compelled him to seek means of subsistence elsewhere, and he went, accordingly, at Niethammer's request, to Bamberg, where he edited a political paper for two years. In 1808 he was appointed rector of the gymnasium at Nuremberg, and there he had just completed his *Wissenschaft d. Logik* (3 Bde. 1812–16), when he was called in 1816 to a professorship of philosophy in Heidelberg, where he published his *Encyklopädie d. philosophischen Wissenchaften* (1817; 3te Aufl. 1830), in which he first developed his complete system. In 1818, however, he was called to Fichte's place in Berlin, and it was here that he first began to gather around him a new philosophical school. His lectures, which were delivered in a stammering voice, and without rhetorical ornament, yet with the impressiveness of being the expression of laborious thought, attracted hearers from all ranks and professions. He rose to considerable political influence through his official connection with the Prussian government, and his philosophy in some respects lost credit from the generally conservative tendencies of his administration. Still, in his *Rechtsphilosophie* (1821), he demands representation of the people, freedom of the press, publicity of judicial proceedings, trial by jury, and the administrative independence of corporations. In the midst of an active life he was suddenly cut off by cholera, Nov. 14, 1831, and buried beside Fichte. A complete collection of his works was published in 18 vols. (Berlin, 1832–41), and his life written by Rosenkranz (1844).

At first, as has been intimated, Hegel's philosophy started from the same position as Schelling's—the principle of the identity of knowing and being; but at an early period he departed from Schelling's theory, that this identity can be apprehended only through an intellectual intuition, of which the understanding can render no account. Carrying out rigorously the principle from which both started, as embodied in the proposition of Spinoza, that the order and connection of thoughts are the same as the order and connection of things, Hegel sought to find the universal form which characterizes the process both of existence and thought. This universal form he recognized as the process of becoming (*Werden*). But the process of becoming is only the union of position and negation; for all that becomes at once posits, and, by passing into something else, removes itself. Identical with this process is the process of thought; for every thought involves its contradictory. But the contradictory is not a mere negation; it is in itself positive; the conception of unity, e.g., is not more positive than its contradictory, the conception of plurality. Every thought therefore, as it involves its contradictory, adds to its own contents, and by the combination of the two contradictories, we rise to absolute knowledge. This process, involving in it the three stages of position, negation, and the union of both, determines the method of Hegel; for according to this method, his entire system is organically necessitated in all its parts to a threefold division corresponding to the three stages in the process of thought and existence. The point from which all knowledge must start is thought simply and in itself, the science of which, logic forms, therefore, the first part of this system. But thought passes into something other than itself, exists out of itself in nature, and the philosophy of nature accordingly ranks as the second part. Returning again from its estrangement in nature, thought becomes conscious of itself in mind, and consequently the philosophy of mind forms the third part. It would be profitless to give a mere enumeration—and nothing more could be attempted here—of the various subdivisions, in their degrees of subordination, into which these three grand divisions are separated. For an account of the system, consult, besides the ordinary histories of philosophy, Vera's *Introduction à la Philosophie de Hegel* (Paris, 1855), and Haym's *Hegel u. seine Zeit* (Berlin, 1858). For the English student of Hegel, Dr. Hutchison Stirling's *Secret of Hegel* is invaluable.

Hegelianism is commonly employed to denote the direction of philosophical speculation in the large school which arose under the influence of Hegel. During Hegel's life, and on till 1841, when Schelling came to Berlin, Hegelianism found a very efficient organ in the *Jahrbücher für wissenschaftliche Kritik* (1827–47, ed. by Henning); and through the influence of the Prussian minister, Von Altenstein, a large number of the philosophical chairs in the Prussian universities were secured for Hegelian professors. In the second grand department into which Hegel had divided his system, the philosophy of nature, his speculations did not give the same impetus to inquiry as those of Schelling had given; but this may be accounted for from the consideration that the enthusiasm for physical investigations, which was rising when Schelling's early speculations appeared, had reached its culmination before Hegel began to attract notice. In logic, also, owing to Hegel's own exhaustive treatment, little has been done by his disciples, except in the way of explication and apology, of which Schaller's, Erdmann's, and Hinrichs's works on the science are specimens. But in psychology we find developments of the Hegelian principles by Rosenkranz, Michelet, and Erdmann; in jurisprudence, by Gans; in ethics, by Michelet; in æsthetics, by Vischer, Hinrichs, Hotho, Rosenkranz, Ruge, and Schnaase; in the history of philosophy, notwithstanding Hegel's own work, by Erdmann, Michelet, Rosenkranz, Schwegler, Zeller, &c. In the philosophy of religion, however, Hegelian speculation has been more widely and powerfully influential than in any other department; Daub, Marheineke, Rosenkranz, Conradi, Göschel, Vatke, and a host of other more or less known writers, joining with Hegel in seeking to elict the eternal meaning embodied in the historical and symbolical forms of Christianity. But as soon as Hegelianism reached this sphere of speculation, it began

to show antagonistic tendencies. These became especially apparent four years after Hegel's death, in the controversy raised by Strauss's *Leben Jesu* (1835), and continued by his *Christliche Glaubenslehre* (1840). The Hegelians then split into three sections, called severally the right, left, and center, according as they represent supernaturalism, rationalism, or a mediating mysticism. Among those of the extreme left, known also as the *young Hegelians*, and dubbed by Leo with the felicitious but untranslatable diminutive *Hegelingen*, the Hegelian philosophy, which had before been ecclesiastically and politically conservative, became thoroughly radical. In 1838 Ruge began to edit for them a special organ, *Die Halleschen Jahrbücher*, which was very influential among the youth of Germany, but was prohibited in 1847, after having been transferred to Leipsic under the title of *Die Deutschen Jahrbücher*. Weisse, Fichte, (the younger), Ulrici, Fischer, and Carriere, were named pseudo-Hegelians because, though retaining a large element of Hegelianism, they introduced at times an extraneous method and divergent results. Beyond Germany, Hegelianism is represented in France, in Italy, in Denmark, and in Sweden by numerous philosophers of note; and has also exerted an important influence on British and American thought, especially in the region of psychology.

HEGESIP'PUS, the earliest of the Christian church historians. He was b. of a Jewish family in Palestine about the beginning of the 2d c., but became a Christian at an early age, and was a member of the church of Jerusalem. He went to Rome in the pontificate of Anicetus, visiting upon his journey many churches, and especially that of Corinth, where Primus was bishop. He remained in Rome till the death of Soter (176), and is supposed to have died in the year 180. It was during his sojourn in Rome that he composed his history, in five books, entitled *Memorials of Ecclesiastical Affairs*, which, however, appear not to have formed a complete and continuous history, although they extend from the death of Christ down to the writer's own age. Unhappily, the work as a whole has perished, and we know it only from some fragments which Eusebius has embodied in his own history, and the most important of which are his account of the martyrdom of St. James and also of St. Simeon of Jerusalem. Eusebius speaks highly of the doctrinal fidelity of Hegesippus and St. Jerome, of the simplicity and purity of his style. Another work on the wars of the Jews (also in five books), ascribed to Hegesippus, is confessedly spurious. The most complete collection of the fragments of his writings is that of Gallandus in the second volume of his great collection. See also Grabe, *Spicilegium* tom. ii.; and Fabricius, *Bibl. Græca*, vii. 156.

HEGI'RA. See HEDJRAH.

HEIBERG, JOHANN LUDVIG, 1791–1860; a Danish critic and poet, son of Peter Andrea Heiberg, the political writer, and of the famous novelist afterwards the baroness Gyllembourg-Ehrensvärd. Johann was educated at the university of Copenhagen. In 1812 he visited Sweden and made some stay in Stockholm. In 1813 his first publication appeared, a romantic drama for children, entitled *The Theater for Marionettes*. This was followed by *Christmas Jokes and New Year's Tricks*. *The Imitation of Psyche*, and *The Prophecy of Tycho Brahe*. These works were looked upon as the opening of a great career. In 1817 Heiberg took his degree, and in 1819 went abroad with a grant from government. In 1822 he published his drama of *Nina*, and was made professor of the Danish language at the university of Kiel, where he delivered a course of lectures, comparing the Scandinavian mythology as found in the *Edda* with the poems of Oehlenschläger. In 1825 he went to Copenhagen for the purpose of introducing the vaudeville on the Danish stage. In 1828 he brought out the national drama of *Elverhöi;* in 1835 the comedy of *The Elves*, and in 1838 *Fata Morgana*. In 1841 he published a volume of *New Poems*, containing *A Soul after Death*, perhaps his masterpiece, and other pieces. He founded the *Copenhagen Flying Post* in 1827, and continued until 1837. In 1831 he married Johanne Louise Pætges, the greatest actress that Scandinavia has produced. His scathing satire at last begun to make him unpopular; and this antagonism reached its height when in 1845, he published his little malicious drama of *The Nut Cracker*. He received, however, in 1847 the responsible post of director of the national theater. He filled it for seven years, but resigned in 1854.

HEI'DE, a small t. of Prussia, in the province of Sleswick-Holstein, is situated in northern Ditmarsh, 32 m. n.n.w. of Gluckstadt. It is a pleasant, well-built town, with a large market-place. The inhabitants are employed chiefly in agriculture and general trade. Pop. '75, 6,722.

HEI'DELBERG, an ancient city of Germany, in the grand duchy of Baden, is situated on the left bank of the river Neckar, in one of the most beautiful districts in the country, on a narrow strip of ground between the river on the n., and the northern extremity of the Geisberg mountains on the south. It is 13 m. s.e. of Manheim, and about 54 m. s. of Frankfort-on-the-Main. The town consists mainly of one street about 3 m. in length. Among its most important buildings are the church of the Holy Ghost, through which a partition-wall has been run, and in which service according to the Catholic and Protestant rituals, is simultaneously carried on; the church of St. Peter's, on the door of which Jerome of Prague, the companion of Huss, nailed his celebrated *theses*, at the same time publicly expounding his doctrines before a multitude assembled in the churchyard; and the ruins of the castle, which was formerly the residence of the electors

Palatine, and which, in 1764, was set on fire by lightning, and totally consumed. In the cellar under the castle is the famous Heidelberg tun, 36 ft. long and 24 ft. high, and capable of containing 800 hhds. Heidelberg is celebrated for its university, which, after those of Prague and Vienna, is the oldest in Germany. It was founded by the elector Ruprecht I. in 1386, and continued to flourish until the period of the thirty years' war, when it began to decline. In 1802, however, when the town, with the surrounding territory, was assigned to the grand duke of Baden, a new era commenced for the university, and it rapidly became famous. It comprises faculties of theology, law, medicine, and philosophy, has 110 professors and lecturers, and is attended by from 600 to 800 students. Its library consists of about 300,000 volumes and 3,000 manuscripts. The trade and manufactures of the town are inconsiderable. Heidelberg, originally an appanage of the bishopric of Worms, became in 1155 the seat of the counts Palatine, and continued to be so for near six centuries. After the reformation Heidelberg was long the head-quarters of German Calvinism, and gave its name to a famous Calvinistic catechism. Heidelberg suffered much during the thirty years' war, was savagely treated by the French in 1688, and was in 1693 almost totally destroyed by them. Pop. '71, 19,988; '75, 22,335, of whom two-fifths are Catholics, and about 600 Jews.

As the residence of the rulers of the Palatinate, Heidelberg underwent all the vicissitudes of that much-suffering electorate. See PALATINATE.

HEIDENHEIM, a t. in Würtemberg, on the Stuttgart and Nordlingen railroad, 46 m. e.s.e. of Stuttgart; pop. 5,677. There are manufactures of cotton, paper, woolens, etc., and a large trade in cattle and grain.

HEIGHTS, MEASUREMENT OF, may be performed in any one of four ways: by the aid of trigonometry; by leveling; by ascertaining the atmospheric pressure at the top and bottom of the height by the barometer; or by ascertaining the boiling point of water at the top and bottom by the thermometer. As the second and third methods are treated of elsewhere (see LEVELING and BAROMETER), the first and fourth alone are here considered. The first method is often more convenient than any of the others, as it does not require the ascent of the height, nor even a near approach to it. There are two cases of the problem: Case 1 (when there is level ground in front). Let ACD be a height of irregular form, take O and M, two stations on the level ground in front, find the angles AOB, AMB, and measure OM; then as AOM, AMO (which is AMB subtracted from 180°), and OM are known, AO can be found; and since now AO and the angle AOM are known, AB can be found. If the height is regular in form, all that is necessary to be done is to measure OC, calculate CB, find AOB; then AB can at once be calculated by the ordinary rules.—Case 2 (when there is no level ground in front). Suppose the height of A above O (fig. 2) is to be found. Take another station M, from which A and O are visible, measure the angles AOM, OMA, and find OM by leveling (q.v.), then OA can be found; at O take the angle AOB (the angular altitude of A), then from OA and AOB, AB can be known. If the height of one point above another—the latter not being the observer's station—be required, then the height or depression of the first, and the height or depression of the other above or below the observer's station, must be found separately as before, then the difference (if both are above or both below the observer's level) or sum (if one is below it) of these results gives the number required. For instance (fig. 1), the height of A or AB is first found, CE or the height of E is next calculated, and their difference, AB to CE, or AF, is the height of A above E.

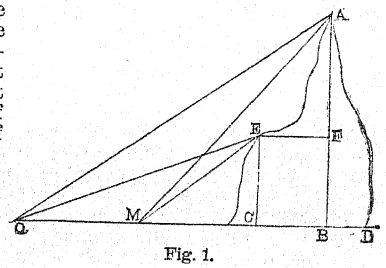


Fig. 1.

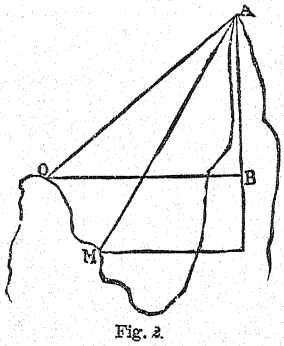


Fig. 2.

Besides this rigorous trigonometrical method, there are many ways of estimating pretty nearly the height of objects, with little or no calculation. For instance, if the height is perpendicular, and the ground in front on a level with the base, take two pieces of wood, hinged or jointed together at an angle of 45°, or a large pair of compasses opened to that angle; place one leg horizontal and directed to the base of the object, and move the instrument towards it, or from it, until the other leg points to the top; then the distance of the angle from the bottom gives the height.

The fourth method is often used in measuring the height of mountains when great accuracy is not required, or when the apparatus requisite in applying the other methods is not at hand; all the apparatus required in this method being two thermometers, a tin pot to boil the water, and a book of tables such as those given by col. Sykes in *Hints to*

Travelers. The method depends upon the fact that vapor of water or steam has a certain tension or elastic force according to its temperature, thus: at 32° it can support 0.2 of an inch of mercury; at 80° it can support 1 in.; at 150°, 7.42 in.; at 180°, 15.5 in.; at 212° (the ordinary boiling-point), 30 in., or the whole pressure of the air. By observing, therefore, the temperature at which water boils, we can find, by means of a table of the elastic force of vapor at different temperatures, the pressure, in inches of mercury, to which it is subject at the time. Now, beginning at the level of the sea, it is found by experiment that a fall of 1° in the boiling-point corresponds to an elevation of 510 ft.; at an elevation of 2,500 ft., the difference for a degree is 520 ft.; at 5,000. it is 530 ft.; at 17,000, it is 590 feet. An approximation for medium elevations may be made by taking 530 ft. on an average for the difference corresponding to 1°, then 530 *multiplied by the number of degrees between the boiling-point and* 212° *will give, approximately, the height.*

HEIJN, or **HEYN**, PETER PETERSEN, a famous Dutch admiral, was b. in 1577, at Delftshaven, near Rotterdam. Of low origin, he gradually advanced himself by his bravery to the highest dignities. As vice-admiral of the fleet of the Dutch West India company, he in 1626 engaged and utterly defeated the Spaniards in All Saints' bay, captured 45 of their ships, and returned to Holland with an immense booty. In consequence of this splendid victory, the company raised him to the rank of admiral. Only two years after this, he captured, almost without requiring to strike a blow, the grand Spanish silver flotilla, the value of which was estimated at 12,000,000 Dutch guilders. As a reward of this unparalleled success, he was, in 1629, named admiral of Holland. Shortly after, he met his death in a fight with two ships off Dunkerque. A marble monument is erected to his memory in the old church at Delft.

HEIL'BRONN (formerly, *Heiligbronn, holy well*), an important trading and manufacturing t. of the kingdom of Würtemberg, in the circle of Neckar, is situated on the right bank of the river Neckar, in a beautiful and fertile valley, 28 m. n. of Stuttgart. The church of St. Kilian, built from 1013 to 1529, a noble edifice, partly Gothic and partly Renaissance; the old town-hall, *der diebsthurm*—the thief's tower—in which Götz von Berlichingen was confined; and the house of the Teutonic knights, now a barrack, are the chief buildings. Though wine and field and garden produce are still cultivated by many of the inhabitants, trade and manufactures are the chief branches of industry now carried on here. Paper, chemical products, silk, dye-stuffs, gold, silver, and iron wares, tobacco, vinegar, etc., are manufactured for export. Gypsum and sandstone are quarried in the vicinity. Pop. '75, 21,208.

HEI'LIGENSTADT, a regularly built and walled t. of Prussian Saxony, is situated on the Leine, near the Hanoverian frontier, 50 m. n.w. of Erfurt. It was the capital of the department of the Harz, in the kingdom of Westphalia, from 1807 to 1814. Weaving, dyeing, and paper-manufacture are carried on. Pop. '75, 5,201.

HEIL'SBERG, a small t. of Prussia, in the province of Prussia, is very beautifully situated on the Alle, 43 m. s. of Königsberg. It was originally the chief town of Ermeland, one of the old divisions of Poland. Pop. '75, 5,770, who manufacture cloth, leather, etc.

HEIL'SBRONN, a small t. in the Bavarian circle of middle Franconia (pop. 1000), worthy of note as the ancient burial-place of the Hohenzollern Burggrafs of Nuremberg. The convent of Heilsbronn owes its origin in 1132 to bishop Otho of Bamberg, and its subsequent rich endowment to the counts of Ahenberg, from whom it passed in heritage to the Nuremberg princes, who thenceforward retained the lay-proprietorship of the institution. Nearly all the members of their house were buried here till the end of the 15th c., when it became the burial-place of the Franconian branch of the Hohenzollerns, till their surrender of their Franconian hereditary lands. Since the suppression of the monasteries in 1555, little has been done to keep up the splendor of Heilsbronn; but the church still retains a large number of highly interesting monuments, at once commemorative of ancient German history, and illustrative of the progress of art in Germany during the middle ages. The village of Heilsbronn, which lies on the Schwabach, possesses mineral springs, and has manufactories of wax-cloth and woolen goods. The history and antiquities of Heilsbronn convent have been made the subject of several interesting treatises, of which the most complete is Hocker's *Heilsbronnisches Antiquitätenschatz*, and Stillfried's sequel to the same work.

HEIMDALL, or HEIMDALER, in Norse mythology, a son of Odin, whose mother was of the Totun race, often said to be the son of the nine virgin sisters. He is called "Goldtooth," his teeth being of that metal; and the "owner of the vaulted arch" (rainbow), and dwells in Himminbjörg, the mountains of heaven at the end of the rainbow. He is the warder of the gods, and keeps watch that the giants do not cross over the rainbow bridge. He sees by day or night, a hundred miles around him; he hears the growing of the grass, and of the wool on a sheep's back. He figures at the death of Badur, and will appear at Ragnarök (the last day), and blow his horn, which will be heard throughout the universe, and will be the signal for the final dissolution.

HEIMR (Icelandic, *home*, or *abode*); in Norse mythology nine worlds are named: Muspelheim, Asaheim, Ljosalfaheim, Vanaheim, Mannaheim, Jötunheim, Svartalfa-

heim, Helheim, and Niflheim. The highest is Muspelheim (world of fire), the home of Surt, in the highest region of which Gimle (heaven) was seated. The lowest is Niflheim (mist-world), the home of cold and darkness, having in its midst the fountain Hvergelmer, where the dragon Nidhogg dwells. Midway between Muspelheim and Niflheim is Mannaheim (man's world), the round plane of the earth surrounded by the ocean. The gods gave Midgard to the first human pair as a home for their descendants. Far above Mannaheim is Asaheim (world of the gods), forming an immense vault above the earth. In the midst of this is Idavold, the place where the gods assemble, containing Odin's throne Hlidskjalf. Beyond the ocean is Jötunheim (home of giants), separated from Asaheim by the river Iting, which never freezes over. Next above the earth is Ljosalfheim (home of the elves of light), and between it and Asaheim is Vanaheim (home of the vans). Further down is Svartalfheim (world of dark elves); further still Mannaheim, and lastly Helheim (world of the dead, or *hel*), doubtless the original of the English "hell."

HEIMSKRINGLA. See SNORRI STURLESSON.

HEINE, HEINRICH, a modern German poet and wit, was b. at Düsseldorf, of Jewish parents; the date of his birth is Dec. 12, 1799, (not, as often asserted, Jan. 1, 1800). In 1819 he proceeded to the university of Bonn for the purpose of studying law; but he devoted himself with greater ardor to the study of modern and ancient German literature, under the auspices of his master and friend, August Wilhelm Schlegel. He subsequently studied at Berlin and at Göttingen, at which latter place he took his degree as doctor of law in 1825. About this time he abandoned Judaism, and was baptized in the Lutheran church of Heiligenstadt. A visit to the Hartz and to Italy supplied him with materials for his *Reisebilder* (Pictures of Travel, Hamb. 4 vols., 1826–31). This book obtained, on its first appearance, an extraordinarily brilliant success. "Young Germany," in particular, became drunk with enthusiasm. His *Buch der Lieder* (Book of Songs, Hamb. 1827; 10th edit. 1852)—a portion of which had first appeared as *Youthful Sorrows* in Berlin, 1822—was no less fortunate. Many of these songs are of the most exquisite and ethereal beauty. They are unmatched in German literature, except by the lyrics which Goethe wrote in his youth. The revolution of July threw Heine into a violent fit of democracy, and in 1831 appeared his *Kahldorf über den Adel, in Briefen an den Grafen M. von Moltke* (Kahldorf on the Aristocracy, in Letters addressed to Count M. von Moltke). He now found it advisable to leave Germany, and at once proceeded to Paris, where he resided for the rest of his life, cultivating *belles-lettres*, both with a brilliancy and malice hitherto almost unheard of. In 1835 he married a certain "Mathilde," who figures much in his writings, and in 1843–44 visited his native country, to see his mother. On his return he published *Deutschland; ein Wintermärchen* (Germany; a Winter's Tale), in which he recounts imaginary adventures and burlesque episodes, and in which a great number of his countrymen, kings, statesmen, professors, authors, artists, etc., are mercilessly satirized and abused. In 1847 Heine was attacked by disease of the spine, and was almost constantly bedridden. He suffered the most acute pain, together with the loss of eyesight, with the most remarkable equanimity and even good humor, till the day of his death, which took place at Paris, Feb. 17, 1856. His will expressed a desire that no religious ceremonies should be celebrated at his funeral. "This," however, he adds, "is not the weak fancy of a freethinker. For the last four years I have cast aside all philosophical pride, and have again felt the power of religious truth." What faith is to be placed in this assertion may easily be concluded from his subsequently designating the Deity as the "mighty Aristophanes of Heaven," who laughs at his calamities. Besides the works already mentioned, Heine wrote *Französische Zustände, Der Salon, Shakespeare's Mädchen und Frauen, Neue Gedichte, Atta Troll, Romanzero*, etc. A complete edition of his works was published at Philadelphia, by John Weik, in 1856; another was published, by Hoffmann Campe, in Hamburg (1861–63). A French edition of his works (Michel Levy, Paris,) was prepared, with his co-operation, by Loewe-Weimars, Gererd de Nerval, and St. Réné-Taillandier, English versions of some of these are Leland's translation of *The Pictures of Travel* (1856), *The Book of Songs*, by J. E. Wallis (1856), the *Poems* complete by E. A. Bowring (1859), and the *Poems and Ballads* by Theodore Martin (1879). See *Heinrich Heine*, by W. Stigand (1876).

HEINECCIUS, JOHANN GOTTLIEB, a learned jurist of Germany, b. Sept. 11, 1681, at Eisenberg, studied theology at Leipsic, and law at Halle, where, in 1713, he was made professor of philosophy, and in 1720 professor of law. In the latter capacity he went, in 1723, to Franeker, in 1727 to Frankfort-on-the-Oder; but in 1733 returned, as professor of law and philosophy, to Halle, where he died Aug. 31, 1741. His works display a thorough acquaintance with all the departments of jurisprudence, but especially with Roman and German law; and their varied learning, logical arrangement, and elegant Latin, long maintained for them a classical character. His *Antiquitatum Jus Romanum Illustrantium Syntagma*, has been re-edited so lately as 1841 by Mühlenbruch, and his *Elementa Juris Civilis secundum Ordinem Institutionum* (edited by Biener, 1815); his *Elementa Juris Civilis secundum Ordinem Pandectarum*, etc., are still studied by jurists. Heineccius's son, JOHANN CHRISTIAN GOTTLIEB HEINECCIUS, b. 1718 at Halle, died 1791 at Sagan, was for a long time professor in the academy for young noblemen

at Liegnitz, and edited, besides several of his father's works separately, a complete collection of them (*H. Opera Omnia*, 9 vols., Geneva, 1771). Heineccius's brother, JOHANN MICHAELIS HEINECCIUS, b. at Eisenberg 1674, died Sept. 11, 1722, was a celebrated pulpit orator in Halle, and also the first who studied seals scientifically. His theological writings are forgotten, but he is remembered by his *De Veteribus Germanorum aliarumque Nationum Sigillis* (Leip. 1710; 2d ed. 1719), and by the work edited in conjunction with Leuckfeld, *Scriptores Rerum Germanicarum* (Frankf. 1707).

HEINECKEN, CHRISTIAN HEINRICH, 1721–25; a child of extraordinary precocity; b. at Lubeck, where his father was a painter. Able to speak at the age of ten months, by the time he was one year old he knew by heart the principal incidents in the Pentateuch. At two years he had mastered the sacred history; at three was acquainted with history and geography, ancient and modern, sacred and profane; besides being able to speak Latin and French; and in his fourth year he devoted himself to the study of religion and church history. He was able to reason on and discuss the knowledge he had acquired. Crowds of people flocked to Lubeck to see the wonderful child; and in 1724 he was taken to Copenhagen at the desire of the king of Denmark. On his return to Lubeck he began to learn writing, but his sickly constitution gave way and he died in his fourth year.

HEINSIUS, ANTONIUS, 1641–1720; grand pensionary of Holland, confidential friend and agent of William of Orange. After the latter became king of England he left the affairs of Holland in the hands of Heinsius, who brought about the participation of Holland in the grand alliance concerning the Spanish succession with England, Prussia, Denmark, Savoy, and Hanover. He sturdily opposed the efforts of Louis XIV. to open negotiations with the allies for peace, and when it was at last effected he was the last to sign the treaty.

HEINSIUS, DANIEL, 1580–1655; a famous Dutch scholar. In 1594, being already remarkable for his attainments, he was sent to the university of Franeker to perfect himself in Greek under Henricus Schotanus. He stayed at Franeker half a year, and then settled at Leyden for the remaining sixty years of his life. There he studied under Joseph Scaliger, and there he became the friend and associate of Marnix de St. Aldegonde, Janus Douza, and Paulus Merula. His proficiency in the classic languages won the praise of all the best scholars in Europe, and offers were vainly made to him to accept honorable positions outside of Holland. He soon rose in dignity at the university of Leyden. In 1602 he was made professor of Latin in the university of Leyden, in 1605 professor of Greek, and at the death of Merula, in 1607, he succeeded that illustrious scholar as librarian. The Dutch poetry of Heinsius is of the school of Roemer Visscher, but attains no very high excellence. It was, however, greatly admired by Martin Opitz, who was the pupil of Heinsius, and who, in translating the poetry of the latter, introduced the German public to the use of the rhyming Alexandrine.

HEINTZELMAN, SAMUEL P., b. Penn., 1805; graduated at West Point, served on the northern frontier in the Florida war and in the war with Mexico, and later in California and on the Texas frontier chiefly against the Indians. In 1861 he was made col., and assigned to duty in Washington. The same year he was appointed brig.gen. of volunteers and commanded at Alexandria, Va. He was wounded in the first battle of Bull Run. In 1862 he commanded the army corps before Yorktown, and was engaged in the battle of Williamsburg. Promoted to maj.gen., he was in the Fair Oaks and the seven days' conflict, and in the second Bull Run battle, as well as at Chantilly. He commanded the defenses at Washington, and in 1864 assumed the command of the northern department, Ohio, Michigan, Indiana, and Illinois, and in the autumn of 1865 was mustered out of the volunteer service. Early in 1869 he was retired from duty, with the rank of maj.gen. in the regular army.

HEIR, in Scotch law, is often used in a loose sense to denote the persons entitled to succeed to the heritable as well as to the movable estate. In Scotland the same rule exists as in England, that if a person do not by deed *mortis causa* (which operates like an English will) dispone or convey his estate to some other person, the law points out who is to take such estate, and that person is the heir-at-law. The rules by which the heir to heritable estate in Scotland is pointed out differ considerably from the English rules. These rules are the same as to the descendants of the deceased person A. But after A's descendants are exhausted, differences begin, for then it is not the father, nor yet the eldest brother of A, but the next younger brother of A, who next succeeds; then the next younger again, until the youngest brother; after whom and his descendants comes A's next elder brother; and so on upwards to the eldest brother of all. In Paterson's *Compendium of English and Scotch Law*, the different order of succession in both countries is shown in a map. There was a difference in Scotland as regards heritable estate which had been purchased by a person (in which case it was called conquest), and who died leaving brothers both elder and younger: in such case, contrary to the general rule, the estate went first to the next elder brother. But after 1874 this distinction was abolished. In Scotland, when females succeed equally, they are called heirs-portioners (q.v.). In Scotland, though not in England, the mother never succeeds in any event, or any relatives, except brothers and sisters german, who trace through her.

There was an important difference in Scotland as to the vesting of the heritable estate of a deceased person. At the death of the owner, his heritable estate did not immediately vest in the heir, but lay in an intermediate state, then called the *hæreditas jacens*, and the person entitled to be the heir had to be served heir, or make up his titles, and enter to the estate. This was altered in 1874, and the estate now vests at once upon the death of the last owner, 37 and 38 Vict. c. 94, s. 9. The general rule also exists in Scotland, that the heir-at-law takes the estates subject to his ancestor's debts; indeed, he used to be liable for all the debts, though far exceeding the property left, provided that he did not take certain precautions to escape this passive representation, as it was called, for the barbarous maxim prevailed, *hæres est eadem persona cum defuncto*. The steps to be taken to guard against liability in such cases are matters of detail which do not require to be described, and are no longer necessary since the act of 1874. Another important distinction exists in Scotland, viz., that an heir need not be born in lawful wedlock, as in England, but it is enough if the father marries the mother afterwards, and so legitimates him.

The word "heir" is often distinguished into several kinds. Thus, an *heir by destination* is a person who is pointed out by a certain deed to succeed in a certain order. So is an *heir of provision*. An heir-at-law is also often called an *heir of line*, because he succeeds according to a certain line or order; and an *heir-general*, because he is the general representative of the ancestor, in contradistinction to an heir-special, who is pointed out by deed. An *heir of entail* is the person who succeeds to an entailed estate by virtue of the deed of entail, which prescribes the order of succession. An *heir of conquest* meant, as above stated, the heir of an ancestor who acquired the estate in question by purchase, and not by succession. See SUCCESSION.

HEIR (*ante*), at common law, one who is born or begotten in lawful wedlock, and upon whom the law devolves an estate immediately upon the ancestor's death. No one is the heir of a living person, but one may be the heir apparent or presumptive. Neither a monster nor a bastard can be an heir. In civil law any one who succeeds to the rights and occupies the place of a deceased person is an heir. An *heir apparent* is one who has an absolute right to an inheritance if outliving the possessor. *Beneficiary heirs* accept succession under the benefit of an inventory, the main purpose of which is to limit liability for debts. A *collateral heir* is one not in direct line, as a brother, uncle, aunt, nephew, or niece. A *conventional heir* takes succession by virtue of a contract, as by marriage contract. A *forced heir* is one who cannot be disinherited. Any heir at common law is a general heir. Irregular heirs are (in Louisiana) those who are neither testamentary nor legal, but are established for the succession by law. The civil code of that state provides that when the deceased has left neither lawful descendants nor ascendants nor collateral relations, the law calls to the inheritor a surviving husband or wife, or his or her natural children, or the state *heirs at law* are the same as heirs general, those who stand in natural succession. *Legal heirs* are persons of the same blood as the deceased who take succession by force of law, thus differing from a testamentary heir who succeeds by the act of the deceased. Three classes of legal heirs are recognized; the children and other lawful descendants; the fathers and mothers and other lawful descendants; and the collateral kindred. An *heir presumptive* is one who may be the legal heir, but whose right may be destroyed by a later born child. A *testamentary heir* succeeds under a regularly made will. *Unconditional heirs* inherit without reservation.

HEIR, or HEIR-AT-LAW, in English law, means the person who, in the event of no will being left by a deceased person which indicates a different person, is entitled by law to succeed to the real estate of such deceased person. The term is never used in the loose sense which prevails in Scotland, as including both heirs, properly so called, and executors or next of kin. When a person in England or Ireland does not think fit to exercise the undoubted right which belongs to him of leaving his real property by will to whomsoever he pleases, to be enjoyed after his own death, the law steps in, and appoints such a person for him, and this person is the heir-at-law. The law, in selecting these heirs, proceeds on certain fixed rules of primogeniture and relationship, preferring males to females. The eldest son is preferred to all the rest of the family, and his descendants; then the next eldest son and his descendants; and so on to the youngest son, after whom the daughters succeed equally or all together, and are then called coparceners. After the descendants of the deceased person, who may be called A, are exhausted, then A's father succeeds; after whom follow A's eldest brother and descendants; then A's next eldest brother; and so on to the youngest brother; after failure of whom and his descendants, then all A's sisters by the full blood succeed equally as coparceners; then A's half-brother by the father's side, and descendants, etc.; then A's half-sisters by the father's side, all as coparceners; after whom succeed A's paternal uncles and aunts in a similar order. Where there are no heirs whose relationship can be traced to the deceased person, then the real estate goes to the crown.

The moment a person dies leaving real estate in England, such real estate vests at once in the heir-at-law, whoever that may be, without any ceremony or formality being required. The heir-at-law, however, takes the property subject to the debts of the deceased, and must pay off all these, provided there is no personal estate sufficient to

pay them, but in no case can he be liable beyond the value of the estate itself. The heir, it is true, may be sued for these debts, in the first instance, by any of the creditors, but he may afterwards have the real estate exonerated, thereby shifting the liability to the personal estate. When the deceased had land which was subject to a mortgage debt, then that debt is a burden on the land, and must be borne by the heir; but the law was otherwise before 1854.

The law of succession in Ireland is entirely the same as in England. See SUCCESSION.

HEIR-APPARENT, in English law, means the person who is certain to succeed if he outlive his ancestor; thus the eldest son is so, because no other person can ever come between and obtain precedence. In Scotland the phrase is sometimes used also popularly in this sense, but the words "apparent heir," when used technically there, mean quite a different thing, viz., the person who, after his ancestor's death, is entitled to succeed, provided he make up his titles, but who has not yet actually done so. The apparent heir has a year to deliberate, called the *annus deliberandi*, whether he will enter upon the property, because the responsibility is so much greater in Scotland than in England.

HEIRESS means a female heir when there are no male heirs to succeed. Where there are several females, all sisters, who are in that case equally entitled, they are sometimes called co-heiresses, but more properly *coparceners* in England, and *heirs-portioners* in Scotland.

HEIRESS. In heraldry, a lady is accounted an heiress if she has no brothers who leave issue. The husband of an heiress is entitled to bear her arms in an escutcheon of pretense, i.e., a small escutcheon in the center of his paternal shield, and the children of an heiress may quarter her arms with their paternal coat. Neither practice is of very early introduction in heraldry. See MARSHALING OF ARMS.

HEIR AND EXECUTOR, a short phrase to denote that branch of the law in which a leading distinction is made between the two kinds of property left by a deceased person, viz., real and personal. All a man's property falls under one or other of these heads. If real, it goes to the heir-at-law; if personal, it goes to the executors or administrators, often called the personal representatives. In Scotland the same leading distinction exists under the head of heritable and movable, but in Scotland some things are classed among heritable, which in England would not be classed among real property. Thus, in Scotland, a lease is heritable property, and goes to the heir-at-law, while in England it is personal, and goes to the executor or administrator. So annuities in England are personalty, and in Scotland are heritable subjects, and there are some other differences not easily to be explained popularly.

HEIR-FEMALE means the female heir connected through a female.

HEIRLOOM, in English law, means certain chattels which go to the heir-at-law by special custom, and have already come through several descents. The chattels included are the best of everything, as pots, pans, tables, &c. But the right is obscure. The word is more frequently used now to designate some chattel which a testator has bequeathed to the person, whoever he may be, who is to take the real estate. In Scotland a somewhat similar, but by no means identical, phrase is used, viz., *heirship movables*, which is a wider right, and includes the best articles of furniture in the house of a person who left heritable property. The extent of this right is also not clearly settled.

HEIR-MALE means the male heir connected through a male.

HEIR-PRESUMP'TIVE, in English law, means the person who would succeed if the ancestor were to die immediately, but who may ultimately be displaced if the ancestor live longer. Thus, an only daughter is the heir-presumptive until a son is born, who thereupon displaces her. In Scotland, though the phrase is also used popularly in this sense, yet in its technical sense it means the person who is certain to be heir if he outlive his ancestor. In short, a presumptive heir in Scotland would be called an heir-apparent in England.

HEIRSHIP MOVABLES. See HEIRLOOM.

HEIRS-PORTIONERS, in Scotch law, mean either two or more females, being sisters, or sisters and the children, male and female, of deceased sisters, who are entitled to succeed to heritable estate. Thus, if A dies leaving three daughters, all three succeed equally if alive; or if some had already died leaving children, then the children represent the parent, and succeed to the parent's share along with the surviving sisters, all being called heirs-portioners. In such cases, the eldest heir-portioner is entitled to the mansion-house over and above her equal share of the rest. She alone also takes a peerage or dignity, if there is any in the family. In England coparceners, though resembling heirs-portioners, have not identical rights. See Paterson's *Comp. of E. and S. Law*, s. 777.

HEL, the northern goddess of the dead, who dwelt beneath one of the three roots of the sacred ash Yggdrasil, was the daughter of the evil-hearted Loki (q.v.), by the giantess Angurboda. Hel, together with her brothers, the wolf Fenrir, and the serpent

Jormundgand, was bred up in the giant's home of Jötunheim, where she remained, till at the request of the Æsir, or gods, the All-father sent for her and her brothers; when, knowing that by their origin these children must prove a great source of calamity, he resolved upon their destruction, and after casting the serpent into the deep ocean, which surrounds all lands, and where it has grown so large that it encircles the whole world, and bites its own tail, he hurled Hel into Niflheim (q.v.), over which he gave her authority, and in which she was to assign places to all who die of sickness and age. Her vast abode is surrounded by a high inclosure with massive gates. Her dwelling is *elindnir*, dark clouds; her dish, *hungr*, hunger; her knife, *sultr*, starvation; her servants, *gangliti*, slow-moving; her bed, *kör*, sickness; and her curtains, *blikiandabli*, splendid misery. She is easily recognized by her fierce aspect, and her half-black, half flesh-colored skin. Hel was inexorable, and would release no one who had once entered her domain. See BALDER.

After the introduction and diffusion of Christianity, the ideas personified in Hel gradually merged, among all the races of northern and German descent, in the local conception of a hell, or dark abode of the dead. See Thorpe's *Northern Mythology*, Grimm's *Mythologie*.

HEL, in Norse mythology, a goddess or giantess who dwells in Niflheim under the roots of Yggdrasil, and rules over nine worlds. Her residence is called Helheim, and the Hel-way thither is long. Its course is northward and downward; gloomy rivers surround her world, one of which flows through valleys filled with swords. A dog stands outside of a cave, and with loud howling greeted Odin when he rode down to Hel to wake the prophetess in her grave-mound e. of the Hel-gate to inquire the fate of Balder. Hel binds the dying with chains that cannot be broken. She receives all who die of sickness or old age. Her company is large, but her shadowy realm has room for all. The worst go into Niflheim; or the ninth and lowest world, into the place named Anguish, the threshold of which is Precipice, their table is Famine, their waiters Slowness and Delay, and their bed is Care. Hel rides a horse with only three feet. Faith in this goddess is not yet extinct. Hel-shoes (hell-shoon) are still put on the feet of the dead, and her dog is heard barking to give warning that death is at hand. In Norway when any one recovers from dangerous illness he is said to have given Hel a bushel of oats, in allusion to the belief that she wanders around in the form of a horse. That the English noun "hell" is derived from the name of this goddess seems beyond doubt.

HELAMYS, *Pedetes capenses*, the Jerboa or jumping hare; a rodent of s. Africa, of the family *pedetidæ*. Its length is 12 to 15 inches; it occasionally jumps over 30 feet. It is exceedingly timid, and its habits are nocturnal.

HEL'DER, a thriving seaport and strongly fortified t. in the province of Holland, Netherlands, stands on the *Marsdiep*, which unites the Zuyder Zee and the German ocean, and separates n. Holland from Texel. It is 45 m. n.n.w. of Amsterdam, with which it is connected by the grand ship canal. See AMSTERDAM. Helder is protected from the inroads of the sea by an enormous dike, six m. in length, 40 ft. broad at the top, on which there is a good road, and which presents to the sea a sloping side of 200 ft., inclined at an angle of 40°. This dike is built entirely of huge blocks of Norwegian granite. Here alone, along the whole coast, is deep water found close to the shore, a fact accounted for by the rush or "race" of the tide, the violence of which is so great here that no sand is allowed to accumulate. Fort Kykduin is surmounted by a tower and light-house. Its harbor, which is well sheltered by the dike, can easily contain 300 large vessels. Pop. (Dec. 31, '74), 20,729.

HELEN, the daughter of Zeus and Leda, wife of Tyndareus, king of Sparta. According to the ancient legend, she was so exceedingly beautiful, that at the age of ten she was carried off by Theseus and Pirithous, but was recovered subsequently by her brothers, Castor and Pollux. Tyndareus afterwards engaged her suitors, who numbered about 30, by a solemn oath, to unite together to aid the husband whom Helen should choose, in case of any attempts being again made to carry her off. In accordance with this oath, her husband, Menelaus, when she was afterwards carried off by Paris, son of Priam, king of Troy, summoned all the princes of Greece to avenge the injury he had sustained, and thus gave rise to the Trojan war. The stories concerning the fate of Helen are inexhaustible. The ordinary legend states that after the death of Paris, she voluntarily married his brother Deiphobus, and that on the taking of Troy, in order to recover the favor of Menelaus, she betrayed Deiphobus into his hands. On the fall of Troy, she returned with Menelaus to Sparta; but after his death was driven from the country, and having gone to Rhodes, was there murdered by the queen of the island. By her husband Menelaus, she had one daughter, Hermione. Greek artists have represented her in their works as the prototype of female beauty, and she has frequently been celebrated by the tragedians in their dramatic works.

HELENA, a t. in Phillips co., Ark., on the Mississippi, 75 m. below Memphis, at the e. terminus of the Arkansas central railroad; pop. 5,000. It has 9 churches, 2 newspapers, oil mills, and some manufactories, but its main business is in cotton, of which 40,000 to 50,000 bales are shipped yearly.

HELENA, the capital of Montana, in Lewis and Clarke co., 14 m. w. of the Missouri, and near the Rocky mountains; pop. 10,000. Rich gold mines were found in its vicinity about 1864, and since then the city has grown rapidly. It has a court-house, banks, a land office; quartz crushing, flour, and lumber mills; daily and weekly newspapers, a hospital, a Roman Catholic academy and convent, and the public offices of the territory.

HEL'ENA, the name of several female saints of the Catholic church, the most celebrated of whom is the empress Helena, wife of Constantius Chlorus, and mother of Constantine the great. The place of her birth is a subject of controversy: according to one account, she was born in Bithynia; but the English church historians commonly claim her as a native of Britain, to which opinion some probability is added from the fact, that her first-born son, Constantine, was born in that country. She became a Christian during the youth of Constantine, and it is thought not unlikely that her example and her teaching co-operated with public motives in determining Constantine to embrace the Christian religion. It was not, however, till after the defeat of Maxentius that Helena formally received baptism. She was at this time far advanced in years; but she survived her baptism for a considerable time, and deserved the gratitude of the Christian community by her zeal for the advancement of religion, and her many acts of piety and munificence. Among the public events of her Christian life, recorded by Catholic historians, the most remarkable is the discovery (according to the belief of the time) of the cross of our Lord (see HOLY PLACES). She died in the year 328, or, according to another account, in 326.—Two other royal or princely ladies of the same name are honored as saints. The first, whose honors are confined to the Russian church, was the wife of the grand duke Igor, and at her baptism in Constantinople (955), changed her original name, Olga, into Helena. She is held in the highest reputation for sanctity in the Russian church. The other was a native of Skofde, in west Gothland, and lived in the 12th century.

HELE'NA, ST., perhaps the best known of all the lonely islands in the world, is situated in the Atlantic, in lat. 15° 55′ s., and long. 5° 44′ w. Greatest length of the island, 10½ m.; breadth, 7 m.; area, 47 sq. miles. Pop. '71, 6,241. It is 850 m. from the nearest land, the island of Ascension, and about a half more from the nearest point of the African continent. The island was discovered in 1502, on St. Helena's day (May 22), whence its name, by the Portuguese navigator, Juan de Nova Castella. It afterwards became a Dutch possession, was ceded by Holland about the middle of the 17th c. to the English East India company, and made over by them to the British crown in 1833. Its value consisted in its being a convenient halting-place on the homeward voyage from India—a value enhanced by the fact, that the cape of Good Hope had, ten years previously, been colonized by the Dutch. On the outward voyage, however, it was not available for sailing-vessels, which, under the influence of the easterly trade-winds, could reach it at last only after overshooting it far both to the w. and to the s; and this difficulty of access peculiarly fitted it to be the residence of Napoleon Bonaparte, who here lingered in hopeless captivity from 1815 to 1821. The nature of the coast, too, would render a hostile landing next to impracticable, presenting, as it does, either a naturally scarped face of cliffs ranging from 600 to 1200 ft. high, or the mouths of ravines protected by forts and other military works. There is one good inlet, called James's bay, possessing a fine harbor. Here is situated James's town, the only place of any note in the island.

About 6,000 acres—one-fifth of the entire surface—are available for cultivation, but not more than 500 are actually under cultivation; while uplands of volcanic origin, rising in Diana's peak (in the center of the island) to the height of 2,700 ft., feed large numbers of goats. There are several plains, the largest of which is Longwood, where stands the house in which Napoleon lived. Supplies of provisions, properly so called, are mostly imported, more especially for the resident population.

HEL'ENSBURGH, a rising t. and favorite watering-place of Scotland, in the co. of Dumbarton, is pleasantly situated on the right bank of the firth of Clyde, opposite Greenock, from which it is 4 m. distant, and 23 m. w.n.w. of Glasgow by railway. It was founded in 1777 by sir James Colquhoun, and named after his wife Helen. In 1858 direct railway communication was opened up between Helensburgh and Dumbarton and Glasgow, and since that time the town has greatly increased. Pop. '71, 5,975; but in summer, the numbers are nearly doubled.

HELI'ACAL RISING (from Gr. *helios*, the sun). A star is said to rise heliacally when it rises just before the sun. When the sun approaches a star which is near the ecliptic, the star becomes for a season invisible—the heavens being too bright in the quarters of sunrise and sunset, at the times of its rising and setting, to allow it to be seen. But when the sun, progressing in its orbit, separates from the star, and the latter begins to rise first, it in time rises so much earlier than the sun, as just to be visible before daylight. It is then said to rise heliacally.

HELIAND, a Saxon poem of the 9th century. The portion yet preserved sets forth the life of Christ as told by the four evangelists, whose various narratives the author seeks to harmonize. It is thought to have been composed by a Saxon writer of unknown

name at the request of the emperor Louis the pious. Like all the most ancient remains of Teutonic poetry, *Heliand* is written in alliterative verse, of which the writer was perfect master. It is almost the only remnant of the old Saxon dialect, and has therefore a high philological value, but it is still more interesting from a literary point of view. The poet does not merely repeat his authorities; while true to the main facts of the original story, he allows his imagination to play upon them in a free and poetic spirit. He realizes intensely the incidents in the career of the Founder of Christianity, and imparts vitality and definiteness to the received conception of His character. The diction is simple and popular, but marked by an elevation of sentiment adapted to the theme, and the author often succeeds most happily in imparting to his style color, variety, and animation. The 9th c. is remarkable in the history of old English and old Norse poetry; the *Heliand* affords proof of that same impulse which operated also upon the higher minds of Germany. The historical aspects of this great work are hardly less important. Of all the German tribes the Saxons were the last to submit to the influence of Christianity. They regarded baptism as the symbol of Frankish supremacy, and clung tenaciously to the ancient Teutonic faith. It was only when Charlemagne, after more than 30 years of warfare, forced the new creed upon them that it gained acceptance by them, and then when they talked of Christ and the saints, they associated them with Woden and Thor, and took delight in the heathen poetry which had been handed down from remote periods.

HELIAN'THUS. See JERUSALEM ARTICHOKE, and SUNFLOWER.

HELI'CIDÆ (Gr. *helix*, a spiral), a large family of gasteropodous mollusks, of the order *pulmonata*, and of which snails (q.v.) are familiar examples. The order is distinguished by having part of the mantle cavity formed into an air-sac or lung. The helicidæ are land mollusks. They have a spiral shell, into which the body of the animal can be withdrawn. Most of the species pretty much resemble the common snails in their habits, feeding on vegetable substances of various kinds, and often proving troublesome to the farmer and gardener.

HEL'ICON, a mountain, or rather a mountain-range in the s.w. of the province of Bœotia, in Greece, may be regarded as a continuation of the range of Parnassus. It was celebrated by ancient poets as the favorite seat of the Muses. The loftiest summit (now called Paleovúvi) is about 5,000 feet high. At the bottom of Helicon stood the village of Ascra, the residence of Hesiod, and the seat of the earliest school of poetry in Greece. In ascending the mountain from Ascra (now Pyrgáki), the traveler passes the famous fountain of Aganippe, the waters of which were fabled to bestow inspiration. The grove of the Muses is supposed to have been situated in a hollow at the foot of Mount Mirandáli, one of the summits of Helicon. Leake considers that its site is now occupied by the church and convent of St. Nicholas. Twenty stadia above this was the fountain of Hippocrene, probably the modern Makariotissa, where there is still a fine spring.

HE'LIGOLAND, or HELGOLAND (Holy Land), a small island in the North sea, belonging to Great Britain, is situated about 35 or 40 m. n.w. of the mouth of the Elbe, in lat. 54° 11′ n., and long. 7° 53′ east. It is about a m. long from n. to s., and one-third of a m. from e. to w., one-fifth of a sq.m. in superficial area, and about 2¾ m. in circumference. The island consists of an upper and a lower quarter; the former, "The Oberland," is a rock 200 feet in height, and 4,200 paces in circumference, on which stands a town of 350 houses, and 1913 inhabitants; the latter, "Sandy Island," is a patch of shore with 60 houses s.e. of the cliff, and communicating with it by a flight of 173 steps. The surging of the sea, which has already greatly diminished the size of the island, is fast consuming its shores, and will probably, at no great distance of time, reduce it to a mere sand-bank. Heligoland has two good ports, one on its n. and another on its s. side. The inhabitants are supported chiefly by fishing and commerce, by serving as pilots, and by the strangers who visit Heligoland for the excellent sea-bathing Sandy island affords. A light-house stands on the cliff near the village. There is also a prison, but it is never occupied. The annual value of the fisheries is about £5,000, and the chief products are lobsters and haddocks. Heligoland is an important place in time of war, and commands the German trade in the North sea. The island, which was taken by the English from the Danes in 1807, and was formally ceded to them in 1814, has an English governor, but the internal affairs are managed by a council of the islanders. Four batteries, manned by a garrison of British soldiers, are mounted on the cliff. The British establishment maintained on Heligoland costs about £1000 a year. Steam-boats run between this and Hamburg. Heligoland was anciently sacred to the goddess Hertha, and was the island to which the tribe of the Angli who inhabited the mainland opposite, went to perform religious rites in her honor. On a map discovered by sir William Gell, the situation of many temples, villages, and large tracts of country, are delineated, all of which were swallowed up by the sea, between 700 A.D. and 1200 A.D., according to D'Anville. The sea continued its encroachments, and, before the end of the 17th c., had submerged several churches and monastic establishments. Christianity was first preached here by St. Willibrod in the 7th c., after whose time the island received its present name. Before this, it was called Fosetisland, from the Frisian goddess, Foseta, who had a temple here. The inhabitants

of Heligoland are divided into two classes, differing both in race and occupation—the one being fishers, the other merchants, cultivators, etc. The first are Frisians, a tall and muscular race of hardy seaman, simple and primitive in their habits and holding land-labor in contempt. The merchant class consists of immigrants from Hamburg and other places on the mainland, or their descendants.

HELIOCEN'TRIC, a term in astronomy, signifying that the sun (Gr. *helios*) is taken as the center of reference or view. It is opposed to geocentric, which indicates that the earth is taken for center.

HELIODO'RUS, the earliest and best of the Greek romance writers, was b. at Emesa, in Syria. The church historian Socrates says he became a Christian, and was bishop of Trikka, in Thessaly, about the end of the 4th c., A.D. But it now seems more probable that the romance writer was a Neo-Pythagorean sophist of the 3d century. The work by which he is known is entitled *Æthiopica.* It extends to ten books, and narrates in poetic prose, at times with almost epic beauty and simplicity, the loves of Theagenes and Charicleia. The work is distinguished from the later Greek romances by its vigor and its pure morality. See Rohde, *Der Griechische Roman* (1876). There are editions by Korais (1805), Bekker (1855), and Hirschig (1856).

HELIOGA'BALUS. See ELAGABALUS.

HELIOGRAPHY (*sun telegraphy*), a name given to a method of communicating between distant stations by reflections of the sun upon a mirror or system of mirrors. One great advantage of this method over the ordinary signal system is that the apparatus is more portable, but it can be successfully used only in regions where the atmosphere is clear of clouds through considerable periods of time. Anybody who has any idea of the ordinary method of telegraphing by electricity with the ear alphabet, will understand how spaces of time may be employed to indicate letters and words by means of the eye. There are two methods: the reflector may be obscured except when the screen is temporarily removed to produce a flash or letter; or the reflector may be kept exposed except when it is obscured to produce a letter. The first method is said to be the easier for the beginner, but the second less fatiguing to the eye. The distance through which this mode of communication may be carried on varies with the size of the mirrors and the clearness of the atmosphere. From the Himalayas a 5 in. mirror has communicated distinct signals 60 miles. The instrument could be used with good success on the Andes. When the signaling station forms an angle greater than a right angle between the sun and the receiving station, two mirrors are used to prevent too great a loss of rays by oblique reflection. The mirrors are mounted on tripods, and are held by a socket, or a universal joint. Besides its use as a signaling instrument, the heliograph has served to define distant points in a survey, and for this purpose was employed in the triangulation of India. It was also used by the late astronomer-royal of England at the cape of Good Hope in verifying the arc of the meridian.

HELIOM'ETER, "sun measurer" (from *helios,* the sun, and *metron,* a measure), is an instrument invented by M. Bouguer in 1747, by means of which the diameters of the heavenly bodies can be measured with great accuracy. As improved by Dollond, the object-lens of the instrument is in two halves, each of which will form a perfect image in the focus of the eye-piece; and the images may be made to diverge, coincide, or overlap each other, by varying the distance between the half-lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images may touch each other, then the distance between the centers of the two object-glasses measured in seconds gives the diameter of the sun. Fraunhoffer has made many remarkable improvements on the heliometer.

HELIOP'OLIS (*City of the Sun*), the Greek name of the city called by the Egyptians On, stood on the e. side of the Pelusiac branch of the Nile, near the apex of the Delta, and was one of the most ancient and important of Egyptian cities. Here were the headquarters of the wisdom of the Egyptians. From the priests of Heliopolis, Solon, Thales, and Plato are reported to have learned. Manethon, the historiographer of Egypt, was chief priest of Heliopolis, an office filled centuries earlier by the father-in-law of the Hebrew Joseph. The ruins of Heliopolis still cover an area nearly 3 m. square. One of the red granite obelisks, long famous as Pharaoh's needles, is still standing near the hamlet of Matarieh. There is reason to suppose that the obelisk called "Cleopatra's needle," lately brought to England, had originally been brought to Alexandria from Heliopolis.

HELIOP'OLIS SY'RIÆ. See BAALBEK.

HE'LIOS, the Greek name of the sun (the Roman *sol*), who was worshiped as a god. He was, according to Homer, a son of the Titan Hyperion, and of Theia or Euryphaëssa, and is described by the same poet as giving light both to gods and men. He rises in the east, from the marshy borders of Oceanus, into whose dark abysses he also sinks at evening. The later poets, however, gave him a splendid palace in the east, somewhere below Colchis, and describe him as being conveyed, after the termination of the burning labors of the day, in a winged boat of gold, along the northern coasts of the sea back to Colchis. After the time of Æschylus, he began to be identified with Apollo or Phœbus, but the identification was never fully carried out. His worship was widely spread.

He had temples in Corinth, Argos, Trœzene, Elis, and many other cities, but his principal seat was Rhodes, where a four-team was annually sacrified to him. In addition, it was customary to offer up white lambs or boars on his altars. The animals sacred to him were horses, wolves, cocks, and eagles. Sculpture represents him, for the most part, as riding in his chariot, drawn by four horses.

HE'LIOTROPE, *Heliotropium,* a genus of plants of the natural order *borragineæ* (q.v.); of the section, sometimes made a distinct order, *ehretiaceæ,* the fruit separating only when ripe into four carpels. Many of the species have fragrant flowers. The PERUVIAN HELIOTROPE (*Heliotrope Peruvianum*), a small shrub, seldom more than 2 ft. high, with oblong-lanceolate wrinkled leaves, and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla. The EUROPEAN or COMMON HELIOTROPE (*Heliotrope Europæum*), a native of the south and west of Europe, is an annual with small white, or rarely pale red, flowers. Important healing powers were once erroneously ascribed to it in cases of cancerous and scrofulous sores; it is, however, astringent and mucilaginous. Many hybrid heliotropes are now to be seen in flower-gardens and green-houses, exhibiting great variety in the size and color of their flowers. They delight in a rich, light soil. The shrubby kinds are generally propagated by cuttings. Large quantities of the flowers are used by perfumers for making scents. Classical fable accounts for the name heliotrope (Gr. *helios,* the sun, and *trepo,* to turn), by representing Clytia as turned into this flower through gazing at Apollo.

HELIOTROPE, or BLOODSTONE, a variety of chalcedony or of jasper, of a green color with red spots. The finest heliotropes consists of chalcedony, and are translucent, at least at the edges; the jasper bloodstones are opaque. Heliotrope is found in many parts of the world, as in Scotland, but the finest specimens of this mineral are brought from the southern parts of Asia. It is well known to the ancients, who obtained it chiefly from Ethiopia and Cyprus. It is much used for boxes, seals, etc.; and those specimens are most valued in which the ground color is beautiful, and the spots bright and well distributed. It was much used in the early ages of the Christian church for the engraving of sacred subjects, the figures being so managed that the red spots should represent drops of blood. Different accounts are given of the origin of the name heliotrope.

HELIOTROPE AND HELIOSTAT, names applied to instruments used by surveyors for rendering distant stations distinctly visible. This is managed by placing a mirror at the distant station, and adjusting it so that at a particular hour of the day (arranged beforehand), the light of the sun shall be reflected from the mirror directly to the surveyor's station. The surveyor must make his observation almost at the instant he sees the glancing of the mirror, as the constant change of the sun's position in the heavens produces a corresponding change in the direction of the rays reflected by the mirror. Gauss (q. v.) invented such an instrument about 1821, which is used abroad, especially in America, for geodetic surveys, and is said to possess such power, that a mirror 1 in. square is visible 8 m. off, in average sunny weather, and appears as a brilliant star at a distance of 2 m.; while some heliotropes have been used so powerful as to be visible nearly 80 m. off. The term heliostat, applied by capt. Drummond to an instrument invented by him for the same purpose, more properly belongs to an instrument invented by S'Gravesande, consisting of an equatorial revolving on its polar axis, so that the sun, when once accurately in the focus of the telescope, continues *steadily fixed* there. Drummond's heliostat is chiefly used in Britain.

HELIOTYPOGRAPHY (otherwise *photoheliography;* from Gr. *helios,* the sun.) Mr. De la Rue, in the observatory at Kew, has produced, on sheets of paper, pictures in which the solar spots are represented without the aid of drawing or engraving of any kind. In one form of operation (noticed in the *Proceedings* of the Royal astronomical society), the sun's spots were viewed through a Newtonian reflector of 18-inch diameter, and 10 ft. focal length, producing an image that would have made the sun's disk 3 ft. diameter. By a nice adjustment, the image of a portion of the disk was received on a glass plate rendered sensitive by collodion. The first part of the process was then complete—the sun painting a picture of his own spots on a piece of glass. Then came the transfer of this negative to a positive, by the usual photographic means of printing, but with a varnish of very complex chemical nature on the positive plate. This completed the second stage—photography producing a very faint picture on the positive plate. Then came chemistry; by dissolving away certain constituents of the varnish, which had been more affected than the rest by the actinic force of the sun's light, the surface of the positive plate became a series of ridges and hollows, *relievi* and *intaglie,* extremely minute in their differences of level, but still sufficiently marked to convey the notion of a kind of engraving. Next came electrotype, or galvanography. The plate, in the state just described, served as a matrix or foundation on which an electrotype cast could be taken. By Pretsch's process, this cast may be so varied as to be available either for surface-printing or for printing on the copper-plate plan. Other solar phenomena, such as the corona, and the appearance presented during annular and total eclipses, have been made to reproduce themselves in a similar way. See also PHOTOGRAPHIC ENGRAVING and PHOTOGRAPHY.

HELIX, in architecture, a spiral form, as when a flight of steps winds round a cylindrical space or center post. The name is also given to the little volutes under the flowers of the Corinthian capital.

HELL (Heb. *Sheol*, Gr. *Hades*, Sax. *Hell*, Ger. *Hölle*), originally a cavern or deep and dark abyss, and sometimes applied (as Gen. xxxvii. 35; Job xiv. 13) to the grave, is commonly used to signify the place, or the condition after death, of the souls of those who, having failed during life to fulfill the essential obligations imposed by the natural or the positive divine law, are consigned to a state of punishment or purgation. With the same unanimity which has existed as to a state of reward after death (see HEAVEN) almost all the various religions, whether ancient or modern, number among their most prominent doctrines the belief of a state of punishment after death—the nature of which is variously modified according to the peculiar tenets of each religion—for unexpiated guilt. Among early Christian writers, the word hell is variously employed, sometimes to signify a place of temporary purgation, in which sense it comprehends the Roman Catholic purgatory (q. v.); sometimes the place (*limbus patrum*) in which the souls of the just of the old law awaited the coming of Christ, who was to complete their felicity; sometimes the place in which unbaptized children are believed to be detained, on account of the stain of unremitted original sin; and lastly, the prison of those who die stained with the personal guilt of grievous sin. Many controversies, which would be entirely out of place here, have arisen about the details of this doctrine, as to the place, the nature, and the duration of the punishment of hell. It will be enough to say that, although according to the literal sense of more than one passage of Scripture, and the popular notions of the various Christian communities, the place of hell would seem to be assigned to the interior abysses of the earth, or to the depths of the intermundane spaces, yet even the formularies of the Roman Catholic church, with all their rigorous precision of detail, and still more those of other communions, have abstained from any formal declaration as to the locality of the punishment of the damned. As to the nature of the punishment to which they are subjected, whether it is confined to the "pain of loss"—that is, to the remorseful consciousness of having forfeited the presence of God, and the happiness of heaven—or whether and to what degree it further includes the "pain of sense," there is some difference between the eastern and the western churches, and it is sometimes alleged that the eastern church altogether rejects the idea of punishment of sense. This, however, is a mistake; both churches agree that the punishment of hell includes the "pain of sense," the controversy between them having regarded not the existence of the pain of sense, but certain questions as to its nature, and especially whether it consists of material fire, a point which, in the decree for the union of the Greek and Latin churches at the council of Florence, was left undecided. The controversy on the subject of the eternity of the punishment of hell dates from an early period, Origen and his school having taught that the punishment of hell was but purgatorial in its object; that its purifying effect having once been attained, the punishment would cease for all, even for the devils themselves; and that its duration in each case is proportioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness, was the well-known Origenistic theory of the *apocatastasis*, to which so many of the early writers refer. It was rejected, however, by the common judgment of antiquity, and was formally condemned by the second council of Constantinople—a condemnation founded on the literal sense of many passages of the Scripture (see Matt. xviii. 8; xxv. 41 and 46; Mark ix. 43; Luke iii. 7; 2 Thess. i. 9; Apoc. xx. 10, etc.); and in the controversies between the eastern and western churches, on the subject of the punishments of hell, the belief of their eternity, in the most strict sense of the word, was always recognized as a common doctrine of both. In the New Testament, the name *Gehenna* is frequently used to designate the place of punishment of the damned (see Matt. v. 22, 29, 30; x. 28; xviii. 9; xxii. 13; Mark ix. 43; Luke xii. 5; James iii. 6). The latter word, indeed, unlike the Hebrew *sheol* and the Greek *hades*, is never found in any other signification than that of the place of punishment of the sinner after death.

HELL, MAXIMILIAN, 1720-92; b. Hungary; a Jesuit and an astronomer. While in Vienna he studied at the observatory, and at a later period was professor of mathematics in the university of Klausenburg, and afterwards director of the Vienna observatory until his death. He was the author of two works on astronomy.

HELLADOTHERIIDÆ (Gr. "Greek wild beast"), a family of mammals which has been established for an extinct animal found in the miocene formation near Athens. It resembled the giraffe in its high shoulders and neck, which latter, however, was shorter than the giraffe's; and also the antelope in the proportion of its limbs. It was of very great size. The molar teeth were broad, and the plates of enamel on their grinding surfaces were simple curves. The skull shows no signs of having been horned. Generic name, *Helladotherium*.

HELLANICUS, a Greek logographer, or reporter, b. Mytilene, in the 5th c., B.C. As a historian he was greatly in advance of preceding logographers. Not content with repeating the traditions that had gained general acceptance through the poets, he tried to produce them as they were locally current, and availed himself of the few national or priestly registers that presented something like contemporary registration. Thus, in

the first place, he gave in many points accounts quite different from the usual beliefs, e.g., he recorded the local belief in the troad that Troy had not been wholly destroyed by the Greeks, but had continued to exist to his own time; and in the *Atthis*, touching on Spartan affairs, he made no reference to Lycurgus, but attributed the Spartan constitution to Eurysthenes and Procles. Now, it is certain that the Spartan state registers could not have made any mention of Lycurgus on account of the plan on which they were framed. Secondly, Hellanicus laid the foundations of a scientific chronology, though his materials were insufficient, and he often had recourse to the usual rough reckoning by generations. On account of his deviations from common tradition, Hellanicus is often called an untrustworthy writer by the ancients themselves, but probably few authors would have been more useful to a scientific student if his works had been preserved.

HEL'LAS, the original home of the Hellenes, according to the received opinion, was first a town, and afterwards, under the name of Phthiotis, a well-known district of Thessaly. The ancients also sometimes applied this name to the whole of Thessaly. With the spread of the Hellenic people southwards, the term embraced a gradually increasing territory, until it came to denote the whole of middle Greece or Greece proper (modern *Livadia*). At a still later period, the Peloponnesus itself was included under the designation; and finally, Hellas came to be used in the broadest sense, as comprehending the whole of Greece, with its islands and colonies.—The HELLENES, or Greeks, as distinguished from the more ancient Pelasgians, received this name in the belief that they were descended from a certain Hellen. This mythical personage, a son of Deucalion and Pyrrha, or, according to others, of Zeus and Dorippe, and the father of Æolus, Dorus, and Xuthus, was said to have been king of Phthia, and to have ruled over all the country between the rivers Peneius and Asopus.

HELLE, in Greek mythology, a daughter of Athamas, king of Thebes in Bœotia, and the goddess Nephele whom he had married at the command of Hera. The king was secretly in love with Ino, a mortal, and married her. The family dissensions soon became so violent that he consulted a Delphic oracle, where the priestess (bribed by Ino) told him that he must sacrifice Prixus, the brother of Helle. To save her children Nephele dispatched them to Colchis on the back of the ram with the golden fleece; but while crossing a strait Helle fell off and was drowned. The strait was named the Hellespont or sea of Helle.

HELLEBORE, a name applied to two very different genera of plants. The genus to which it more properly belongs, and to which it has belonged, since very ancient times, *hellebŏrus*, is of the natural order *ranunculaceæ*, and is characterized by a calyx of 5 persistent sepals, often resembling petals; a corolla of 8 or 10 very short, tubular, honey-secreting petals; numerous stamens and 3—10 pistils; a leathery capsule, and seeds arranged in two rows. The species are perennial herbaceous plants, mostly European, generally with a short root-stock; the stem mostly leafless, or nearly so, but sometimes very leafy; the leaves more or less evergreen, lobed, the flowers terminal. A familiar example of this genus is the BLACK HELLEBORE—so called from the color of its roots—or CHRISTMAS ROSE (*H. niger*), a favorite in our flower-gardens, because its large white flowers are produced in winter. The leaves are all radical; the stalks generally one-flowered; the flowers white or tinged with red. Black hellebore formerly enjoyed a higher reputation as a medicinal agent than it now possesses. Melampus is represented as employing it in the treatment of madness centuries before the Christian era. The root is the part used in medicine, and it is imported into this country from Hamburg, and sometimes from Marseilles. It consists of two parts—the rhizome or root-stock, and the fibers arising from it. The former is nearly half an inch thick, several inches long, and knotty, with transverse ridges and slight longitudinal striæ; the latter are numerous, cylindrical, brown externally, and whitish internally. The taste is slight at first, then bitter and acrid. The chemical composition of the root is not very accurately known. It is not much employed at the present day, but it has been found of service (1) in mania, melancholia, and epilepsy; (2) as an emmenagogue; (3) in dropsy—its action as a drastic purgative, and its stimulating effect on the vessels of the liver, rendering it useful; (4) in chronic skin diseases; and (5) as an anthelmintic. Ten or fifteen grains of the powdered root act as a sharp purgative. The tincture, which is obtained by maceration in spirit, is usually given when its action as an emmenagogue is required. In an excessive dose, it acts as a narcotic acrid poison, and causes vomiting, purging, burning pain in the stomach and intestines, faintness, paralysis, and death.—STINKING HELLEBORE (*H. fœtidus*) grows on hills and mountains in the south and west of Europe, in some of the chalk districts of England, and in several places in Scotland. It has a very disagreeable smell, and green flowers somewhat tinged with purple. The stem is many-flowered and leafy.—GREEN HELLEBORE (*H. viridis*), also found in the chalk districts of England, has a leafy stem, with a few large greenish-yellow flowers. The celebrated hellebore of the ancients was probably a species peculiar to Greece and the Levant, *Helleborus orientalis* or *Helleborus officinalis;* all the species, however, have similar medicinal qualities. From the abundance of the plant around the city of Anticyra, hypochondriacal persons were said to need a visit to Anticyra.—Closely allied to the genus *helleborus* is *eranthis*, in which the flowers are

surrounded with an involucre, and have a deciduous calyx. A well-known species is the WINTER HELLEBORE, or WINTER ACONITE (*E. hyemalis*), of our gardens, whose yellow flowers, raised only a few inches above the ground, deck the flower-border about the same time with snowdrops. It is a native of the midland parts of Europe, but naturalized in many parts of Britain. It loves shady places.

WHITE HELLEBORE (*Veratrum album*) belongs to the natural order *melanthaceæ*. The genus has polygamous flowers, with 6-leaved perianth, 6 stamens, 3 pistils cohering at the base, a 3-horned capsule separating into 3 many-seeded follicles, and compressed seeds winged at the apex. White hellebore has a leafy stem, sometimes 4 feet high, ovate-oblong leaves, a long terminal compound panicle, and yellowish-white flowers. It abounds in the mountains of the center and south of Europe, but is not found in Britain. The root was once much used in medicine, but now rarely, although it seems to act powerfully in some diseases. It is a very acrid and active poison. Its powder is used to destroy lice, and by gardeners for killing caterpillars. A decoction and ointment of it are sometimes used in itch and ringworm. Caution is necessary even in handling the powder of white hellebore, and very unpleasant effects ensue from its getting into the eyes or nose.—AMERICAN HELLEBORE, or SWAMP HELLEBORE (*V. viride*), known also as Indian poke or itch weed, is frequent in damp grounds from Canada to Carolina Its root has properties similar to those of white hellebore. These properties seem to depend chiefly on an alkaloid called *veratria*.

HELLEN, in Greek tradition the son of Deucalion and Pyrrha, the survivors of the deluge. Hellen had three sons, Dorus, Æolus, and Xuthus; and from Dorus, Æolus, and two sons of Xuthus, the four great branches of the Greek people; while the Greeks collectively are called Hellenes after Hellen.

HEL'LENIST (Gr. *Hellenistes*), the name given to those among the Jews, and afterwards in the Christian church of Judea, who, either by birth or by residence, and by the adoption of the Greek language, manners and usages, were regarded as Greeks, in opposition to the Hebrews properly so called, whether of Palestine or of the dispersion. The name has sometimes been improperly restricted to persons of Greek parentage or descent; but like other Gentile names of the same form, it marks a class distinguished by the peculiar habits and language of Greece rather than by Greek descent. The Hellenists, in this sense, formed a distinct body, and stood in a relation of rivalry, if not of antagonism to the Hebrews (see Acts vi. 1. and ix. 29). There is also a clear distinction between Hellenes (Greeks—from Hellas, q.v.) and Hellenists. The latter might, it is true, be Hellenes by birth, but the prominent idea conveyed by the name was rather the adoption or affectation of Greek manners and language than Greek parentage or blood.

At the time of our Lord's crucifixion, the Jews of the dispersion were to be found in almost every part of the Roman empire; but it was among the Jews settled in Alexandria that the Hellenizing tendency found its freest development; and it is to that city that we must refer the formation as well of that peculiar dialect of the Greek language which is known as the Hellenistic, as of that singularly acute and speculative philosophy which exercised so large an influence on those early Christian schools, of which Origen is the most famous exponent.

The really characteristic element of the Hellenistic Greek consists in its foreign, and especially its Hebrew and Aramaic words and idioms. Although it was in its origin a purely popular form of the language, yet its being employed in the Alexandrian or Septuagint version of the Old Testament, has given to it all the fixedness and definite character of a written language. The Hellenisms of the Septuagint differ in many respects from those of the New Testament, which again present some points of discrepancy with those of the Alexandrian fathers; but there are certain leading characteristics common to them all, which constitute the distinctive forms of the dialect, and which may also be described as peculiarities of structure and forms of thought derived from those Hebrew or Aramaic idioms which were the native modes of speech of the Greek-speaking Hebrews.

The influence of the Hellenistic modes of thought on the philosophy of the Alexandrian schools will be traced under the head of the NEO-PLATONIC PHILOSOPHY. See Frankel, *Monatschrift* (1855); also Winer, *Grammatik des N. Test. Sprachidioms* (2d edition).

HELLER, STEPHAN, b. Hungary, 1814; German composer; studied in Vienna, and in 1829 made a professional tour in Germany. Since 1838 he has been in Paris. His works are chiefly for the pianoforte, and some critics rank him in this respect above Chopin. He has published more than 150 works.

HEL'LESPONT. See DARDANELLES.

HELLEVOETSLUIS, or HELVOETSLUYS, a well-known fortified seaport of the Netherlands, in the province of South Holland, is situated on the Haring Vliet, an arm of the Maas, on the island of Voorne, 17 m. s.w. of Rotterdam. It has an excellent harbor, as well as an arsenal, docks, and a naval school, and it is one of the principal Dutch naval stations. By means of the new canal of Voorden, leading from the Maas to Hellevoetsluis, and so out to sea, large vessels avoid the shallow bar at the mouth of the Maas. Hellevoetsluis is to Rotterdam and the mouth of the Maas what the Helder is to

Amsterdam and the Zuyder Zee. Here William III. embarked for England, Nov. 11, 1688. Pop. (Dec. 31, 1874,) 4,162.

HELL GATE, or HURL GATE, named by the Dutch settlers of New York, *Helle Gat*, is a pass in the East river, between Great Barn island and Long Island, e. of the center of New York island, United States, formerly very dangerous to vessels from its pointed rocks and whirlpools. During 1869–76, extensive submarine galleries and tunnels were excavated in the rock for the purpose of receiving a gigantic charge of dynamite (50,000 lbs.), which was fired by electricity on Sept. 24, 1876, and completely broke up the obstructing rocks.

HELL GATE (*ante*) IMPROVEMENTS. Hell Gate may be more particularly described as that part of the East river between Long island and Manhattan island, also between Long island and Ward's island, and between Ward's island and Manhattan island. (Little Hell Gate is an unimportant small passage between Ward's island and Randall's, lying to the n. and having a transverse direction). The reefs of rock in the main passage, some of which were islands at low tide, caused with the rising and falling of the tide numerous whirlpools and eddies, which rendered navigation at times really dangerous, always difficult; and for large ships impossible, although the depth in the tortuous channel might be sufficient.

A survey was made as long ago as 1848 by (then) lieut.-commanding Charles H. Davis and David Porter, of the U. S. navy, and in their reports they recommended the destruction by blasting of Pot rock, Frying pan, and Way's reef, which lie between Long island and Ward's island. Lieut. Davis proposed also to clear the middle channel, between Long island and Manhattan or New York island, and immediately below Ward's island, which contains Little Mill rock, Great Mill rock, Middle reef, Heel Tap rock, and others; but lieut. Porter advised rather the destruction of a part of Hallett's point, which, in connection with Ward's island, turns the current in the east channel toward Manhattan island, forcing it against the current of the w. channel at right angles. The destruction of the whole of Hallett's point would allow the two currents to meet at a very small angle, but such an operation, it was thought, would require altogether a greater outlay than would be practicable, and the advantages would be slight, because the usefulness of both shores of the river requires the removal of the middle obstructions.

The science of submarine blasting as now understood, had no existence at that time. Where the currents in a stream allowed of the operation, diving-bells were often used as a means of drilling and blasting, but the fierce currents of Hell Gate precluded this method. Physics had taught that the inertia of liquids and even gases could be made available as a reacting force, in mechanical operations, if the primary force or impulse were approximately instantaneous; indeed, ordinary mathematical reasoning leads to this conclusion. The idea of using superjacent water as a "tamping" by simply igniting the explosive upon the surface of the rock was first successfully put into practice by M. Maillefert, with whom a contract was made to remove obstructions in Hell Gate, the money, $14,000, being raised by citizens of New York. He commenced work in Aug., 1851, by a process which consisted in letting down a can of gunpowder on the surface of the rock and exploding it by means of the galvanic current. The can, as a rule, contained about 125 lbs. of gunpowder. He operated upon Pot rock, Frying pan, Way's reef, Shelldrake, Bald-headed Billy, Hoyt's rocks, Diamond reef, and Hallett's point reef. Upon the latter, however, he produced no sensible effect. He reduced the most prominent surfaces of these rocks to an average depth of about 16 ft.; some to 18 ft. depth; one, Way's reef, only to 14. These rocks were originally from 5 to 15 ft. below lowwater mark. He fired in all 620 charges, 284 being upon Pot rock. Bald-headed Billy was blown into deep water with one charge. Six charges, having an aggregate of 750 pounds of powder, and a cost of only $500, deepened Shelldrake from 8 to 16 feet. Other rocks gave more trouble, the deepening of Pot rock from 8 to 18.3 ft. requiring over 34,000 pounds of powder, and costing $6,837.

Congress, in 1851, appropriated to the work $20,000, and of this $18,000 went toward lowering Pot rock to a depth of 20 ft., under the direction of maj. Fraser; the great cost of lowering only two additional feet being in consequence of the considerable increase of surface, and the smoother condition of it. The method was by surface blasting as has been practiced by M. Maillefert. In 1856 it was recommended by the advisory council to the commissioners to further deepen the rocks in Hell Gate, and by the method not of surface blasting, but of drilling. Their statement that this could be easily effected is somewhat remarkable when it is considered that no method of drilling had up to this time been employed, except by use of the diving-bell, impracticable in Hell Gate. Nothing, however, was done until 1866, when brevet maj.gen. John Newton of the U. S. engineers, was ordered to make a survey, the report of which he made to congress in 1867. He proposed the construction of a drilling scow which should be securely moored at the site of operations. A dome made of strong boiler iron, of a hemispherical shape, 30 ft. in diameter, served as a framework for 30 drill tubes. This dome rested upon self-adjustable legs, and was let down to the surface of the rock from amidships of the scow. The self-adjustable legs allowed it to settle in a firm and unmovable position, as regarded the action of the current. The machine was not com-

menced till July, 1869, owing to want of funds. It was constructed, and put into operation on Diamond reef, near the mouth of the East river, in May, 1871. Coenties reef was also operated on with this scow in alternation with the work on Diamond reef. These operations proving satisfactory, the machine was taken to Hell Gate, and 17 holes were drilled into Frying pan rock in July, 1872. Also 11 surface blasts were made. In Aug. of the same year the scow was put to work on Pot rock, where it remained until the close of the year. During this time there happened some sixteen collisions with passing vessels, which caused much delay, so that it was deemed proper to surrender the work until more efficient regulations could be had in regard to pilots. However, during the five months' work on Pot rock, 40 holes were drilled and blasted, and 60 seam blasts and 24 surface blasts were made. The débris had to be removed by divers during slack water. On account of the rapidity of the current at any other time, Way's reef, which had been reduced to a depth of 14 ft. in 1857, and again in 1869 to 17½ ft. by surface blasting, was attacked by the drilling scow in Aug., 1874, and by the end of Jan., 1875, it was reduced to a depth of 26 ft., at mean low water. This rock was 235 ft. long by a maximum width 115 feet. There were 262 holes drilled, having an aggregate depth of 2,130, or an average of a little more than 8 ft. for each hole. The explosives used were over 15,000 pounds of nitro-glycerine for drill blasts and about 1500 pounds for surface blasts; also, 38 pounds of dynamite.

Of the operations which have been completed, those upon Hallett's point reef are by far the most extensive. Hallett's point, the site of fort Stevens, is a considerable peninsula, projecting into the East river immediately above Astoria. The reef, which was dangerous to vessels, ran along the shore about 720 ft., and projected about 300 ft. into the river. This immense mass of rock was removed by tunneling, a process first proposed by Mr. G. C. Reitheimer, and soon after by gen. Alexander of the U. S. engineers, and Mr. A. W. Von Schmidt, C.E., to whom was given the contract for removing Blossom rock in San Francisco harbor, the first operation of the kind ever performed. See SAN FRANCISCO. Blossom rock was, however, of less size than Way's reef, being only 180 by 100 ft. in area, while the latter was 235 by 195 at its greatest breadth. This, as described above, was removed partly by surface blasting, and partly by surface drilling, but at less cost than for removal. For the removal of the reef at Hallett's point, a coffer dam in the form of an irregular pentagon of 140 ft. greatest diameter was erected on the shore, and in this there was sunk a shaft having a diameter of 105 by 95 ft., and a depth of 33 ft. below mean low water. From this shaft diverging tunnels were excavated in the rock, which is a tough gneiss, with nearly a perpendicular dip (the character of all the rock in Hell Gate). As these tunnels extended they were connected by transverse galleries, and afterwards new diverging tunnels, commencing in the galleries were commenced and extended. There were eight concentric galleries, with the addition of two additional partial ones at the periphery, the whole number of tunnels being 35. The mouths of the tunnels were from 17 to 22 ft. high and 12 to 9 ft. wide, but diminishing quite rapidly to keep under the floor of the river. The galleries, which were about 25 ft. from center to center, also varied in height for the same reason. The lineal measure of the tunnels and galleries was 7,425 ft., and the whole area embraced was 2⅝ acres. The ordinary processes now in use for tunneling or excavating rock were employed. See TUNNEL. The mass of rock included in the scope of operation is said to have been something over 110,000 cubic yards; the number of cubic yards of rock removed from the tunnels and galleries being computed to be 47,461 cubic yards. After the excavation was completed, holes were drilled into the piers, which were left standing between the tunnels and galleries, supporting the roof, and also into the roof, and charged with nitro-glycerine held in cans into which the electrodes of a galvanic battery were introduced. Water was let into the mine by a siphon into the shaft the day previous to the explosion, which took place on Sunday, Sept. 24, 1876. It is proper here to state, that the blasting was done on this day, notwithstanding there were protests, because of a delay in the delivery of the explosives, and the charging having been completed, gen. Newton was unwilling to endanger the lives of his men by delay. The time of the explosion was 2 h. 57 m. P.M., at high tide. It lasted about three seconds, the vibration of the earth being slight, but perceptible to a considerable distance. No damage was done to property. The nitro-glycerine used was contained in the following compounds: Dynamite, 28,901 pounds; rend-rock powder, 9,061; vulcan powder, 14,244; making a total of 52,206 pounds, or more than 25 tons. This was contained in 13,596 cartridges. The number of charged holes was 4,427; they were from two to three inches in diameter, with an average depth of 9 ft., and averaged about 8 ft. apart. They were all connected by about 100,000 ft. of wire, and the blasts were exploded by 64 batteries having an aggregate of 960 cells. Three cartridges were usually placed in a cell, with a priming of dynamite which was exploded by the percussion of fulminate of mercury, connected with the voltaic arc. The success may be said to have been perfect. The blasting at first, or before 1874, was principally with pure nitro-glycerine. Afterwards "mica powder," "giant powder," "rend-rock," and "vulcan powder," were used, and although having less power, were found more effective and economical. The amount appropriated by congress between 1868 and 1876 was $1,940,000, of which nearly $1,717,000 was expended upon the operations at Hallett's point.

HELLIN', a t. of Spain, in the province of Albacete, and 40 m. s.s.e. of the town of that name, is situated in a hilly district near the eastern bank of the Mundo, a tributary of the Segura. Its houses are for the most part neatly painted, and, unlike most Spanish towns, it has an air of comfort and cleanliness. In the vicinity are productive royal sulphur mines. Pop. 10,200.

HELLMUTH, ISAAC, D.D., was by birth a Pole and belonged to a Jewish family. Becoming a convert, he entered the Anglican ministry and proceeding to Canada entered upon the duties of his profession. He founded Huron college in 1863, and six years later, at London, Ont., the college and ladies' seminary which bear his name. In 1871 he succeeded to the bishopric of Huron.

HELM, in nautical affairs, denotes the entire steering apparatus of a ship. This apparatus consists of three distinct portions—the rudder, the tiller, and the wheel; although in boats and small vessels the wheel is ordinarily dispensed with. The rudder is the instrument acting directly upon the water, and its mode of action and form will be described under rudder (q.v.). The tiller is a lever, formed into a handle, by means of which the steersman can greatly multiply on the rudder (the position of which is almost identical with the fulcrum, the hinges) the power he exerts against the long end of the tiller. The wheel is an ordinary wheel and axle, moving the long end of the tiller from side to side by the agency of ropes, again multiplying the power, and being otherwise convenient as occupying a smaller space on the upper deck than the long tiller would have taken. To "starboard the helm" is to put the tiller so as to carry the rudder to port; "port the helm," the converse. To "put up the helm," is to let the ship go more fully from the wind; while to "put down the helm," is to exercise a contrary effect.

HELMET, a covering of metal or leather to protect the head in warfare. The earlier Greek and Roman helmets, as shown in many extant sculptures, were surmounted by plumes, but unlike their modern successors, did not protect the face. During the middle ages, helmets were made of the finest steel, often inlaid with gold, and provided with bars and flaps, to cover the face in action, and to allow of being opened at other times. As the employment of firearms became more general, helmets naturally lost their utility, especially as regarded the face. Those still remaining are in military matters limited for the most part to heavy cavalry, afford no protection to the face, and must be considered as rather for ornament than use. Firemen wear a heavy head-piece of leather and brass, to protect them as far as possible from falling ruins at conflagrations In India and other hot climates, helmets of white felt, with the additional screen of rolls of linen, are constantly worn by military men, to protect them from the rays of the sun.

HELMET, in heraldry. From the early simple form known as the Norman, the helmet, at a later period, came to vary in shape according to the degree of the person who wore it, and helmets were set over coats of arms to bear the crest, and indicate by their form the rank of the bearer. The part of the helmet which opens to show the face is called the *visor* or *beaver* (to allow of drinking). The following forms of helmet are in use in English heraldry: 1. The helmet assigned to the king and princes of the blood-royal which is full-faced, composed of gold lined with crimson, and has the vizor divided by six projecting bars. 2. The helmet of the nobility, of steel, with five bars of gold. When placed on the shield, it is exhibited in profile. 3. Knights and baronets have the full-faced steel helmet with the vizor thrown back and without bars. 4. The helmet of esquires, always represented in profile, of steel with the vizor closed. These distinctions are of comparatively recent date. A much greater variety of helmets is in use in continental heraldry. A helmet is never placed over the arms of any woman except the sovereign.

HELMET-SHELL, *Cassis*, a genus of gasteropodous mollusks of the family *buccinidæ;* the animal much resembling the common whelk (q.v.), with which it also nearly agrees in habits; the shell swollen, rather thick and solid, with bold ridges, a short spire and a long aperture, the outer lip toothed, the canal recurved. The species, which are pretty numerous, are all natives of tropical seas. Most of them are beautiful; and they are used by engravers for making cameos, the differently colored layers producing exquisite effects when skillfully cut.

HELMHOLTZ, HERMANN, one of the most distinguished scientific men of the present day, was born at Potsdam in Aug., 1821. He was at first a surgeon in the army, then assistant in the Berlin anatomical museum, and was a professor of physiology, from 1849 at Königsberg, from 1855 at Bonn, and from 1858 at Heidelberg. In 1871 he became professor of physics in Berlin. Helmholtz is equally distinguished in physiology and in experimental and mathematical physics. His physiological works are principally connected with the eye and the nervous system. Thus, we have his exhaustive treatise on *Physiological Optics;* his *Speculum for the Examination of the Retina;* his *Discourse on Human Vision;* and various papers on the means of measuring small periods of time, and their application to find the rate of propagation of nerve disturbances. Of a semi-physical nature, we have his *Analysis of the Spectrum;* his *Explanation of Vowel Sounds* (*Klangfarbe der Vocalen*, see SOUND); and his papers on the

Conservation of Energy with Reference to Muscular Action. In physical science, he is known by his paper on *Conservation of Energy* (*Ueber d. Erhaltung d. Kraft*, 1847, translated [badly] in Taylor's *Scientific Memoirs*, new series); a popular lecture on the same subject (1854); by two memoirs in Crelle's *Journal*, on *Vortex-Motion in Fluids;* and on the *Vibrations of Air in Open Pipes*, etc. His *Populäre wissenschaftlichen Vorträge* appeared in 1865–76.

HELMINTHOL'OGY (Gr. *helmins*, a worm, and *logos*, a discourse) is a term formerly used to denote the science of the natural history of worms generally, but now restricted to the red-blooded worms, such as the medicinal leech and earth-worm.

HEL'MOND, a t. in the Netherlands, province of North Brabant, lies 21 m. s.e. from Bois-le-Duc, on the Aa and South Willemsvaart. It has a good haven. The principal industries are the manufacture of cotton, woolen, and linen fabrics, cotton-printing, dyeing, calendering, beer-brewing, etc. The pop. is nearly 7,000.

HELMONT, JAN BAPTISTA VAN, Lord of Merode, Royenborch, Oorschot, and Pellines, an eminent Belgian chemist, was b. at Brussels in 1577, and d. near Vilvorde in 1674. He went through the regular course of study at the university of Louvain, and on the completion of his education, he was offered and accepted the chair of surgery in that university, the duties of which he discharged for two years. The study of the works of Paracelsus seems to have turned his special attention to chemistry and natural philosophy, and in the pursuit of these sciences he spent several years in the different universities of Italy and France; after which he returned home, married Margaret van Ranst, a noble lady of Brabant, and settled down at his estate near Vilvorde, where he spent the remainder of his life in philosophic investigations of various kinds. It would be impossible, in the limits of this article, to sketch even an outline of his chemical discoveries. Writers of the history of chemistry regard him as the greatest chemist who preceded Lavoisier; and it is much to be regretted that his language is often so obscure, that it is not always easy to ascertain his meaning. He was the first to point out the imperative necessity for employing the balance in chemistry. He paid much attention to the study of the gases, and is supposed by some authorities to have been the first to apply the term *gases* to elastic aeriform fluids. Of these gases he distinguished several kinds. He was also the first to take the melting-point of ice and the boiling-point of water as standards for the measurement of temperature. By means of the balance he showed, in many instances, the indestructibility of matter among chemical changes. For example, he demonstrated that a salt dissolved in water, or silver dissolved in aquafortis, could be recovered unchanged in quantity. It is in his works that the term *saturation* is first employed, to signify the combination of an acid with a base; and he was one of the earliest investigators of the chemistry of the fluids of the human body.

Along with other physiologists of his day, he speculated much on the seat of the soul, which he placed in the stomach. His reasons are chiefly these two: 1. It cannot exist in the brain, because that organ contains (according to Helmont) no blood; 2. It does exist in the stomach, because when we hear bad news, we lose our appetite. Those who wish to know the full value of his contributions to the knowledge of chemistry, may consult the *Histories of Chemistry* written by Kopp and Höfer.

The most important of his works is his *Ortus Medicinæ, id est initia Physicæ inaudita, progressus Medicinæ novus in morborum ultionem ad vitam longam*, which was published by his son four years after his death, passed through a very large number of editions, and was translated into Dutch, French, German, and English. A very curious volume, containing translations of some of his works, was also published by W. Charlton, in 1650, under the title of *The Ternary of Paradoxes; the Magnetic Cure of Wounds; the Nativity of Tartar in Wine; and the Image of God in Man.*

HELM'STEDT, a t. in the n. of Germany, in the duchy of Brunswick, 22 m. e.s.e. of the city of that name, was formerly famous for its university, founded here by Julius, duke of Brunswick, in 1575, and suppressed by Jerome Bonaparte in 1809. The university buildings now serve as court-houses. Manufactures of flannel, soap, hats, and grain-spirits are carried on. Here the first Saxons were baptized by St. Ludgarus. Pop. '75, 7,783. Helmstedt was formerly a member of the Hanseatic league.

HELMUND', a river of Afghanistan, rises 35 m. to the w. of Cabul, at an elevation of 11,500 feet. After a south-westerly course of about 650 m., it loses itself in the salt lake of Seistan or Hamoon by several mouths, about lat. 31° 30′ n., and long. 62° east. The immediate banks, generally bordered by deserts on either side, abound almost everywhere with traces of former cultivation and wealth. Like tropical rivers in general, the Helmund varies largely in volume according to the season, being, in many places, thrice as deep and broad in the rainy season as it is at other times.

HELODERMIDÆ (Gr. *helos*, a nail, and *derma*, skin—nail-skinned), a family of saurians of the group *diploglossæ*, differing from other members of the group by having scales resembling nails over a great portion of the skin; temporal fossæ overarched by skin ossification. They have no premaxillary foramen, and the teeth have short, dilated bases, anchylosed obliquely; mesosternum longitudinal, without lateral limbs; color,

dark, almost black; reticulated spaces between the scales, yellow. It has the name of *scorpion* in southern Arizona. The family was established by Gray and Cope, 1864–66.

HELOISE. See ABELARD.

HELOS, in ancient geography the name of several towns, so called because they were on or near fens. The most important was in Laconia, at the mouth of the Eurotas, in a marshy but fertile plain near the sea. When the Dorians conquered the Peloponnesus they carried the Helots, the inhabitants of Helos, to Sparta as slaves.

HEL OTS. The population of ancient Sparta was divided into four classes, the lowest of which was formed of serfs or slaves, called Helots (probably meaning *captives*, from Gr. *helein*, to capture). These Helots are generally supposed to have formed the original population of the country, and to have been reduced to bondage by their Dorian conquerors, the numbers, however, being swelled from time to time by the conquest of enemies. They belonged to the state, which had the power to set them at liberty; but they toiled for individual proprietors, and were *bound to the soil*, i.e., they could not be sold away from the place of their labor. They were the tillers of the land (for which they paid a rent to their masters), they served at the public meals, and were occupied on the public works. In war they served as light troops, each freeborn Spartan who bore heavy armor being accompanied to battle by a number of them, sometimes as many as seven. On rare occasions they were used as heavy armed soldiers. It is a matter of doubt whether after emancipation they could ever enjoy all the privileges of Spartan citizens. They were treated with much severity by their masters, and were subjected to degradation and indignities. They were whipped every year, to keep them in mind of their servile state; they were obliged to wear a distinctive dress (clothes of sheepskin, and a cap of dog's skin), and to intoxicate themselves, as a warning to the Spartan youth; and when multiplied to an alarming extent, they were often massacred with the most barbarous cruelty. On one occasion, 2,000 of them, who had behaved bravely in war, were encouraged to come forward for emancipation, and were then most treacherously put to death. The Spartans organized, as often as necessity required, *secret service companies* (Gr. *crypteia*) of young men, who went abroad over the country armed with daggers, and both by night and day assassinated the unfortunate Helots, selecting as their special victims the strongest and most vigorous of the oppressed race.

HELPS, Sir ARTHUR, K.C.B., an English essayist and historian, was b. about 1817; and was entered at Trinity college, Cambridge, where he took the degree of A.B. in 1835. On leaving the university he obtained a post in the civil service, and on his resignation, he retired to Bishop's Waltham, in Hampshire, where, in the possession of ample means, he enjoyed lettered ease. His first work of consequence, entitled *Essays Written in the Intervals of Business*, appeared in 1841. It was followed by two dramas, *Catherine Douglas*, and *King Henry the Second* (published in 1843); by an essay on the *Claims of Labor* (1844); and by *Friends in Council* (1847–49). This last work has been, and still is, much admired by the selecter class of readers, and has gone through many editions. His *Conquerors of the New World and their Bondsmen* appeared in 1848, and *Companions of my Solitude* in 1851. Among his subsequent works are—*Oulita*, a play; *The Spanish Conquest in America* (1855–57); *Friends in Council*, 2d series (1859); *Essay on Organization; Life of Pizarro* (1869); *Casimer Maremna*, and *Brevia* (1870); *Life of Hernando Cortes; Thoughts upon Government* (1871); *Life and Labors of Thomas Brassey* (1872); and *Social Pressure* (1874). He was clerk to the privy council, and became a K.C.B. in 1872. He died in 1875.

Helps is the most delightful essayist since Lamb and Hunt. He everywhere exbibits acuteness, humor, a satire which gives no pain, and a quiet depth of moral feeling manifesting itself mainly in an earnest recognition of man's social responsibilities; while his style, in qualities of purity and clearness, can hardly be matched amongst his contemporaries.

HEL'SINGBORG, an ancient fortified seaport t. of south Sweden, 33 m. n.n.w. of the town Malmö, on the sound, opposite Elsinore. Steamers leave Helsingborg almost daily for Copenhagen, Malmö, Elsinore, and other places. There is a good harbor. Earthenware and iron goods are manufactured. Pop. about 6,600.

HEL'SINGFORS, a fortified seaport of Russia, capital of the government of Finland, and after Cronstadt, the most important naval station on the Baltic, is beautifully situated on a peninsula, surrounded by islands and rocky cliffs, in the gulf of Finland, 191 m. w. from St. Petersburg by sea. A series of formidable batteries, called the fortifications of Sveaborg, and consisting of seven strongly fortified islands and numerous islets, protect the entrance to the harbor, and are of such strength, and so well appointed, as to warrant the application to them of the name of the northern Gibraltar. The whole front presented by the successive works is about a mile in length, and, besides the casemates for small arms, the united fortresses mount about 1000 guns, and are garrisoned by 12,000 men. The harbor itself is further defended by two forts. Helsingfors is the largest and handsomest town of Finland; the broad streets, consisting of houses painted externally yellow and green, intersect at right angles, and there are several fine public squares. Of the public buildings, the most striking are the residence of the governor, the senate house, and the university buildings. The university, removed hither from

Abo in 1829, where it had been founded in 1640, comprises four faculties, has 40 professors, and generally about 700 students. In connection with it are a library of 150,000 volumes, a hospital, a botanic garden, and a valuable observatory. Since 1840 Helsingfors has been a favorite bathing-place, and attracts many visitors during summer from St. Petersburg. The town carries on a considerable trade in Baltic produce: it exports chiefly corn, fish, deals, and iron; and manufactures sailcloth and linen. Pop. '70, 32,113, including the garrison.

Helsingfors was founded by Gustavus I. of Sweden in the 16th c., but the site of the town was removed nearer the shore in 1639. In 1819 it became the capital of Finland. During the late Russian war, Sveaborg was bombarded for two days and nights (Aug. 9 and 10, 1855) by a section of the allied fleet, without any material impression being made upon the forts.

HELSINGÖR. See ELSINORE, *ante.*

HELST, BARTHOLOMEW VAN DER, a Dutch painter, was b. at Haarlem in 1613, and d. at Amsterdam in 1670. He attained great celebrity as a portrait painter. One of his works (in the chamber of justice at Amsterdam), representing 30 full-length figures of a train-band with the Spanish ambassador in the midst, was pronounced by sir Joshua Reynolds to be "the first picture of portraits in the world." His "Militia Dinner" is also a splendid piece of art.

HEL'STONE, an old market t. and municipal and parliamentary borough in the county of Cornwall, England, is pleasantly situated on an elevation, at the head of a pretty valley opening to the sea, about 10 m. w.s.w. of Falmouth. It was made a borough by king John in 1201, and from the reign of Edward I. to the passing of the reform act, it sent two members to parliament; since that, one only. May-games, or *floralia,* once common throughout England, are still kept up here. Pop. '71, 8,760.

HELVEL'LA, a genus of fungi, of the order *ascomycetes* (see FUNGI), closely allied to morels, but differing from them in having the *pileus* turned downwards, lobed and olded, and the surface of the *hymenium* even. Some of the helvellæ are edible, and much used in Germany.

HELVEL'LYN, one of the highest mountains of England, in the lake district, Cumberland, between Keswick and Ambleside. It is 3,055 ft. high, is easy of ascent, and commands magnificent views of the surrounding country.

HELVE'TIAN REPUBLIC. See SWITZERLAND, *ante.*

HELVE'TIC CONFESSIONS. See CREEDS AND CONFESSIONS.

HELVE'TII, a Celtic people inhabiting, according to Cæsar, the region between the mountains of Jura on the w., the Rhone on the s., and the Rhine on the e. and n., the region corresponding pretty closely with modern Switzerland. They had 12 towns and 400 villages. The great and fatal event in their history is their attempted irruption into and conquest of southern Gaul, in which they were repulsed by Cæsar with frightful slaughter. The story of this expedition is circumstantially narrated by the Roman commander. They collected three months' provisions, burned their 12 cities, 400 villages, and all isolated dwellings, and made a general rendezvous by lake Leman in the spring of 58 B. C. Cæsar hastened to Geneva, destroyed the bridge, raised two legions in Cisalpine Gaul, and when the Helvetians sent delegates to demand a passage, delayed them until he had built a wall along the Rhone, 16 ft. high and about 19 Roman m. in length, flanked with redoubts. Having vainly attempted to pass this barrier, the Helvetii took another route, but were followed and defeated with a terrible slaughter at Bibracte (modern Autun, in Burgundy), and the remnant obliged to return to their own country, where they became subject to the Romans. Of 368,000 who left their homes, including 92,000 fighting-men, only 110,000 returned. In the commotions which followed the death of Nero, the Helvetians met with another terrible catastrophe. Remaining faithful to Galba, they were fallen upon by Cacina, a general of Vitellius, who gave them to the rapacity of his legions. They were massacred by thousands, multitudes were sold to slavery, and their towns pillaged and burned, their capital destroyed, and their governor executed. From this time they scarcely appear as a distinct people.

HELVE'TIUS, CLAUDE-ADRIEN, sprung from a family of Swiss origin, as the name Helvetius implies, was b. at Paris in 1715, and received a careful education. Intended for a financial career, he was sent, after the conclusion of his studies, to his uncle, D'Armancourt, *Directeur des Fermes,* at Caen, to obtain a practical knowledge of the subject, and at the age of 23 was appointed to the lucrative office of *Fermier-Général;* but the oppressive nature of the duties which it involved was not at all to the liking of Helvetius, who was of a very humane and easy disposition, and he quickly resigned it for the situation of chamberlain to the queen's household. He now led, like every other courtier of his time, a life of mere gallantry, which looks odious enough at this distance of time; but happily he soon grew tired of it, and after marrying in 1751 the beautiful and accomplished daughter of comte de Ligneville, he withdrew to a small estate at Voré, where he spent the most of his life in the education of his family, the improvement of his peasantry, and literary labors. In 1758 appeared his celebrated work, *De l' Esprit,* in which he endeavors to prove feeling (*sensibilité*) to be the source

of all intellectual activity, and that the grand lever of all human conduct is self-satisfaction. But he admits, at the same time, that self-satisfaction assumes different forms; e.g., the self-satisfaction of a good man consists in the subordination of private to more general interests—first to the circle among which he lives; then to the community; and, finally, to the world at large. The philosophy of the book is, of course, materialistic. It was denounced by the doctors of the Sorbonne, and condemned by the parliament of Paris to be publicly burned. Helvetius was much disgusted, and in 1764 left France to visit England and Germany, where Frederick II. received him with distinction. He died at Paris, Dec. 26, 1771, leaving behind him a work, *De l' Homme, de ses Facultés, et de son Education*, which was published by prince Galyzin (2 vols. London, 1773). Among the editions of his collected works, two deserve special notice, both published at Paris in 1795, the one in 5 and the other in 13 volumes. His wife, who survived him many years, resided at Auteuil, near Paris, where she was visited by the most distinguished personages, and is often mentioned in the memoirs of that brilliant period.

HEMADYNAMOM'ETER (derived from the Greek words *hæma*, blood, *dynamis*, force, and *metron*, a measure) is the name of an instrument devised about 30 years ago by Poisseville for determining the pressure of the blood in the arteries and veins of the living body. The pressure of the blood is measured, as in the barometer, by the column of mercury that it balances. The instrument has been recently improved in various ways, and a contrivance has been added by which the oscillations of the mercury are inscribed in the form of an undulating curve on a cylinder made to revolve by clock-work; the height of the undulations denoting the *pressure*, and their horizontal amplitude the *time*.

HEMANS, Felicia Dorothea, an English poetess, was b. at Liverpool, Sept. 25, 1794. At an early age she manifested a taste for poetry, in which she was encouraged by her mother. Her first volume was published in 1808, when she was only 14 years of age, and contained a few pieces written about four years earlier; her second, entitled *The Domestic Affections*, appeared in 1812. In the same year she married capt. Hemans of the 4th regiment, whose health had suffered in the retreat on Corunna, and afterwards in the Walcheren expedition, and who found it necessary a few years after to remove to Italy. After that period they never met. Although five sons were born of this marriage, it was not understood to have been happy. Mrs. Hemans spent the rest of her life in North Wales, Lancashire, and latterly at Dublin, where she died April 26, 1835. Her principal works are: *The Vespers of Palermo*, a tragedy (1823); *The Siege of Valencia; The Last Constantine, and other Poems* (1828); *The Forest Sanctuary* (1827); *The Songs of the Affections* (1830); and *Hymns for Childhood; National Lyrics and Songs for Music*, and *Scenes and Hymns of Life*. A volume of *Poetical Remains* was published after her death, and subsequently a complete edition of her works, with a memoir by her sister, was issued by Messrs. Blackwood.

Mrs. Hemans, without great daring or force, is sweet, natural, and pleasing. But she was too fluent, and wrote much and hastily; her lyrics are her best productions; her more ambitious poems, especially her tragedies, being, in fact, quite insipid. Still, she was a woman of true genius, and one or two of her little pieces, *The Graves of a Household; The Treasures of the Deep; The Homes of England*, and some others, are perfect in pathos and sentiment, and will live as long as the English language.

HEMASTAT'ICS and **HEMADYNAM'ICS**, the statics (q.v.) and dynamics (q.v.) of the blood Gr. *haima*). See Blood, Circulation of the Blood.

HEMATEM'ESIS (Gr. *haima*, blood, and *emesis*, vomiting), a rejection of blood from the stomach, usually in consequence of some morbid change in its mucous membrane. See Stomach, Diseases of. Hematemesis is apt to be mistaken for hemoptysis (q.v.), unless careful attention is given to the mode in which the blood is ejected. The proper remedies are the liberal use of ice or ice-cold water; acetate of lead, in doses of two to five grains; tannin, five to ten grains (it must not, however, be given with acetate of lead); oil of turpentine, six to ten drops, repeated every hour or two. The first and the last are perhaps the most effectual means, which can be used in combination. The turpentine may be given whipped up with the white of an egg. It must be discontinued when the symptoms of urinary irritation begin to appear.

HEM'ATINE, or **HEMATO'SINE**, is the term applied by chemists to the red coloring matter of the blood of the higher animals. In the normal state, it occurs in solution in the interior of the blood corpuscles or cells; but in certain morbid conditions, in which the blood undergoes a species of decomposition, it is deposited in a solid form in the tissues surrounding the smaller vessels through whose walls it has percolated. It can only be isolated in a coagulated form, in which state it has been submitted to analysis by Mulder, who assigns to it the formula $C_{44}H_{22}N_2O_6Fe$. Its chief peculiarity is, that it contains a comparatively large percentage of iron (very nearly 7 per cent). It is the only constituent of the body (if we except the hair) which does contain this metal.

HEMATINE (*ante*), the coloring matter which, when combined with a certain proteid body (probably the globuline of the older physiologists, since called by Preyer globine), forms hemoglobine (q.v.). All the iron belonging to the hemoglobin is a constituent of the hematine; still it is held by modern physiologists that the body hemo-

globin is the real coloring matter of the blood, the hematine not being able to perform the functions of a colorizer and oxygen carrier alone. It must share that power with the proteid body. See HEMOGLOBINE.

HEMATITE (Gr. *haima*, blood), a mineral consisting chiefly of peroxide of iron, often occurs in large quantity, and is a valuable iron ore. See IRON. There are two principal varieties, *red hematite* and *brown hematite*. The former frequently occurs in globular and grape-like masses, with a radiating fibrous structure. It is sometimes of a dull reddish-brown, sometimes of a brilliant bluish-gray color; the streak is blood-red. An earthy kind is called *iron froth*, and consists almost entirely of peroxide of iron. Brown hematite contains about 14 per cent. of water. Its color is generally some shade of brown, sometimes almost black. Different shades of color are often presented in concentric wavy bands. The surface is often covered with a beautiful black varnish, which is sometimes iridescent. It is not unfrequently found crystallized in rhombohedric, prismatic, or tabular crystals. The primary form is a right rhombic prism. Both red hematite and brown hematite are found in Britain, but the former more abundantly.

HEMATOCELE (Gr. *haima*, blood, and *kēlē*, tumor), a tumor containing blood; opposed to hydrocele (q.v.).

HEMATOZO'A (Gr. *hæma*, blood, and *zoön*, a living creature) is the term applied by helminthologists to the entozoa existing in the blood. They occur in mammals, birds, reptiles, fishes, and many invertebrate animals. Some of them belong to the nematoidea, others to the trematoidea, and others to the protozoa. Most of them are microscopic, devoid of generative organs, and exist in the blood, circulating both in the arteries and in the veins. A very small number attain a considerable size, and are provided with organs of reproduction. These larger ones are generally found in some definite part of the circulating system. Thus, for example, in man the *distoma hæmatobium* is almost entirely restricted to the abdominal venous system; in the horse, the *sclerostoma aneurysmaticum* to the abdominal arterial system; and in the porpoise, the *pseudalius filum* to the pulmonary artery and its branches.

Nothing definite is known regarding the origin of these parasites, but certain observations made upon the hematozoa of the frog by Valentin (and subsequently confirmed by Vulpian), lead to the belief, that some of the more minute forms are the larvæ of a worm living in the organs surrounding the vessels. We shall restrict our remarks to the hematozoa occurring in man, the horse, and the dog. By far the most important of human hematozoa is the *distoma hæmatobium* already mentioned. It has only been observed in Egypt, where it is very common, and where it was found by Griesinger 117 times in 363 autopsies. The male, which is the larger of the two, is about three-tenths of an inch in length. The common liver fluke (*D. hepaticum*) has, in one instance at least, been found in the interior of the portal vein. In the various cases in which distomata have occurred in tumors, they must have been conveyed to the places in which they were found by the blood.

In the year 1665 Ruysch discovered a large number of small worms in a dilatation of the mesenteric artery of a horse. Sixty years afterwards, a second case was noticed, and it is now known that such cases are of extreme frequency. These verminous aneurisms of the abdominal arteries occur in the ass and in the mule, as well as in the horse. The worm found in them is the *sclerostoma armatum*, one of the nematoidea, and often more than an inch in length. It is old horses that are chiefly affected; indeed they scarcely ever seem to escape, for Rayer found these tumors 48 times in the examination of 50 worn-out horses. For much very interesting information on this curious subject, the reader is referred to Rayer's memoir in the *Archiv. de Médecine comparée* for 1842.

In the dog, hematozoa sufficiently large to be visible to the naked eye are rare. Thirteen such cases are collected by Davaine in his *Traité des Entozoaires*, 1860, the worm generally being a filaria. The microscopic larvæ of a nematoid worm are sometimes found in enormous quantities circulating in the blood of this animal. From the examination of the blood of 480 dogs, Gruby and Delafond believe that 1 in every 20 of these animals presents this peculiarity.

In none of the above cases does the presence of these entozoa appear to affect the general health of the individual in whom they reside, whether he be man, horse, or dog.—For further information on this subject, the reader may be referred to Davaine, *op. cit.* pp. 308–342, and Vogel's *Pathological Anatomy*, p. 442, etc.

HEMATU'RIA (Gr. *haima*, blood, and *ouron*, urine), the discharge of blood with the urine, usually from disease of the kidneys or bladder. It is rather a symptom than a disease, and takes its character from the associated morbid conditions of the parts concerned. It is a symptom always of some gravity, but not very often directly fatal. Perhaps the best general remedy is the tincture of the muriate of iron, given in water in doses of twenty drops.

HEMEROBAPTISTS, an ancient Jewish sect who made daily ablution an essential part of religion. Epiphanius, who mentions their doctrine as the fourth heresy among the Jews, classes the Hemerobaptists doctrinally with the Pharisees, from whom they

differed only in that, like the Sadducees, they denied the resurrection of the dead. The name has been sometimes given to the Mendæans on account of their frequent ablutions; and in the *Clementine Homilies* St. John the Baptist is spoken of a Hemerobaptist. Mention of the sect is made by Hegesippus and by Justin Martyr in the *Dialogue with Tryphon.*

HEMEROCAL'LIS. See DAY-LILY.

HEMIBRANCHIATES, a group of bony fishes belonging to the order of TELEOSTS, which by some naturalists has been erected into an order, while the teleosts have been raised to the rank of a sub-class. The classification adopted in this work treats the teleosts (q.v.) as the third order in which are found the sticklebacks and pipe fishes (q.v.). The hemibranchiates, as the name implies, have imperfect gills or branchiæ connected with peculiarities of the skeleton.

HEMICRA'NIA (Gr. *hemi*, one half, and *kranion*, the skull; Fr. *migraine;* Eng. *megrims*), a variety of headache (q.v.), distinguished by its affecting only one side at a time, and also frequently by its intermittent character; whence it has been termed, not very accurately, brow-ague.

HEMIDES'MUS, a genus of plants of the natural order *asclepiadaceæ*. The root of *Hemidesmus Indicus* is used in medicine, chiefly in India, and is known as Indian sarsaparilla. It is in some cases a good substitute for sarsaparilla, and appears to derive its properties from a crystallizable and volatile principle called *hemidesmin* or *hemidesmic* acid. The plant is a climbing shrub, with leathery leaves and axillary umbels of flowers. It is common in almost all parts of India.

HEMIGALE, a mammal of the family *viverridæ*, having a body resembling that of the weasel. Its fur is a grayish brown, with six or seven dark wide stripes across the back. It has a pointed head and nose, short ears, long tail, and strong thighs. It is about the size of the ichneumon, and feeds on eggs and small animals including birds. It is a native of the East Indies.

HEMIO'PIA (Gr. *hemi*, one-half, and *ops*, the eye), vision limited to one-half of an object—a peculiar and rare form of disease, very imperfectly understoood.

HEMIPLE'GIA (Gr. *hemi*, one-half, and *plēssō*, I strike), paralysis (q.v.) limited to one side of the face and body, and usually depending upon disease of the brain. Opposed in signification to paraplegia (q.v.).

HEM'IPODE, *Hemipodius*, a genus of gallinaceous birds, nearly allied to quails, but distinguished by a more slender beak, and by the want of a hind-toe. They are the smallest of gallinaceous birds, and inhabit cultivated grounds and sterile sandy plains in warm countries. One species, the ANDALUSIAN HEMIPODE (*H. tachydromus*), is found in Spain, Italy, Sicily, Africa, and Australia. Its whole length is about 6 inches.

HEMIP'TERA (Gr. half-winged), an order of insects, with four wings, a mouth formed for sucking, undergoing imperfect metamorphoses, and having the first pair of wings either of a firm membranous substance without scales, or leathery at their base, and membranous at their tips. Those with the first pair of wings of the former character are the order *homoptera* (q.v.) of many entomologists; the latter are the *hemiptera* proper, the section or sub-order *heteroptera* of Cuvier and others. The wings of the hemiptera proper in general partly overlap each other, and are horizontal or slightly inclined when at rest. Some kinds are wingless, which, however, otherwise exhibit the characters of this order. Some of the hemiptera feed on vegetable, and some on animal juices. The principal changes which they undergo in their metamorphoses are increase of size and development of wings. They are active in all stages. Some of them are aquatic. They are most abundant in tropical countries, and some of the tropical kinds are very splendid. Examples of this order are bugs, water-bugs, boat-flies, and water scorpions.

HEMISPHERE, the half of a sphere, when it is bisected by a plane passing through its center.

HEMLOCK, *Conium*, a genus of plants of the natural order *umbelliferæ*, having compound umbels of small white flowers, small general and partial involucres, the limb of the calyx merely rudimentary, and a compressed ovate fruit with five prominent wavy ridges and no *vittæ*. The best known and only important species is the COMMON HEMLOCK (*C. maculatum*), which grows by waysides, on heaps of rubbish, and in other similar situations in Britain and on the continent of Europe, in some parts of Asia, and now also as a naturalized plant in North America and in Chili. It has a root somewhat resembling a small parsnip; a round, branched, hollow, bright-green stem, 2 to 7 ft. high, generally spotted with dark purple; the leaves large, tripinnate, of a dark shining green color; the leaflets lanceolate, pinnatifid. All parts of the plant are perfectly destitute of hairs, and it is the only British species of the order *umbelliferæ* which has the stem smooth and spotted with purple. Both the general and partial umbels have many rays. The general involucres consist of several small leaflets; the partial involucres of three small leaflets, all on one side. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves are the only part of the plant employed in medicine. They should be gathered just before the time or at the commencement of

flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. They should then be preserved in perfectly closed tin canisters. As, however, the dried leaves sometimes yield no *conia, conylia,* or *coniine* (a volatile alkaloid, which is the active principle in the plant), the fresh leaves are much more certain in their action.

The most important ingredient in hemlock is the *conia,* which is more abundant in the fruit (seeds) than in the leaves. From 40 lbs. of the ripe but green seeds, Dr. Christison obtained two ounces and a half of hydrated conia. As it is volatile, it is obtained by distilling the seeds with water which contains a little potash in solution; conia then passes over with the water in the form of a yellowish oil, and when purified by redistillation, it is obtained as a colorless, transparent, oily liquid, having a specific gravity of 0.8, a penetrating, hemlock-like odor, communicating a burning sensation when applied to the tongue, and acting as a very energetic poison. It exhibits a powerful alkaline reaction, and precipitates many metallic oxides from their salts. Strong sulphuric acid causes its compounds to assume first a purple-red and then an olive-green color; while nitric acid gives a blood-red color, fading into an orange. Its composition is represented by the formula $C_{16}H_{15}N$. Wertheim has recently discovered a second alkaloid in hemlock, which contains the elements of two equivalents more of water than conia. This substance, whose formula is $C_{16}H_{17}NO_2$, he names *conidrin.* It may be sublimed in beautiful colorless needles, and is much less poisonous than conia.

Conia has been introduced into the *pharmacopœia Norvegica* under the name of *coniinum,* the dose being from one-fortieth to the one-sixtieth part of a grain. The following illustrations will give an idea of its activity as a poison: One drop placed in the eye of a rabbit killed it in nine minutes; three drops employed in the same way killed a strong cat in a minute and a half; while five drops poured into the throat of a small dog began to act in thirty seconds, and in as many more, motion and respiration had ceased. It seems to exhaust the energy of the spinal cord, and thus to cause muscular paralysis.

The uses of hemlock in medicine may be arranged under two distinct heads: 1. Those which depend upon its resolvent and alterative powers; and, 2. Those which have reference to its influence over the nervous system. 1. It has been found useful in mammary tumors and profuse secretion of milk, in bronchocele, in enlargements of the liver, spleen, and pancreas, in scrofulous affections, etc., and at one time had a high reputation in cases of cancer. 2. It is useful as an antispasmodic and anodyne in whooping-cough, spasmodic cough generally, asthma, neuralgia, etc.

In large or poisonous doses it sometimes gives rise to coma (such as opium does), and sometimes to convulsions or violent delirium. Kercher relates the following singular instance of delirium from its use: Two priests ate hemlock-root by mistake; they became raving mad, and fancying that they were geese, plunged into the water. For three years they were afflicted with partial palsy and violent pain.

It may be administered internally in the form of powder (of the leaves), tincture, or extract, while externally it may be applied as a soothing application to ulcers, painful piles, etc., in the form of ointment or poultice. The conia being volatile, often escapes from the powdered leaves and from the extract, and of the three preparations named, the tincture is the best. The *succus conii,* or *preserved juice of hemlock,* prepared by Bentley and other pharmaceutical chemists, is more certain in its action than any of the pharmacopœial preparations.

In cases of poisoning by hemlock, the evacuation of the stomach is the first thing to be attended to. Among the ancient Greeks poisoning by hemlock was a common mode of death for condemned criminals, and thus it was that Socrates died; but whether it was the juice of the common hemlock or the water hemlock that was used, is unknown. —WATER HEMLOCK, or COWBANE (*cicūta virosa*), is also an umbelliferous plant, of a genus having much vaulted umbels, a 5-toothed calyx, and almost globose fruit, each carpel with five broad flattened ribs and evident single *vittæ.* Water hemlock grows in ditches, the margins of ponds, and wet grounds in Europe and the n. of Asia. It is more common in Scotland than in England. It has a large fleshy white root, covered externally with fibers; an erect much branched stem, 2 to 5 ft. high; tripinnate leaves, with linear-lanceolate regularly and sharply serrated leaflets, no general involucre or only a single small leaflet, partial involucres of many short narrow leaflets, and white flowers. It is a virulent narcotic acrid poison. Serious accidents have occurred from eating the root. Another species, *C. maculata,* is common in North America, growing in marshy places. It has a spotted stem, like that of true hemlock, the name of which it very generally receives in North America. The leaves are tri-ternate, the leaflets ternate. It is a very poisonous plant, and is the cause of many deaths.—*Cicuta,* in Latin, seems to have been the name of the same plant called *conēion* by the Greeks, but it is not known whether this or the previous plant was so denominated.

HEMLOCK SPRUCE. See FIR.

HEMODORA'CEÆ, a natural order of endogenous plants, consisting of herbaceous plants with fibrous roots, and sword-shaped leaves; differing from *iridaceæ* in habit, and in having the stamens six in number, or if only three, opposite to the petals. There are about 50 known species, chiefly natives of North and South America, south Africa,

the Mascarene islands, and New Holland. Some of them have beautiful flowers. A red color exists in the roots of some; hence the name BLOOD-ROOT has been given to them. In this order are ranked the *vellozias* or tree lilies.

HEMOGLOBINE, the principal constituent of the red blood-corpuscles. It is the coloring matter of these bodies and consequently the coloring matter of the blood. It was formerly supposed that *hematine*, a substance which is intimately combined with a proteid body to form hemoglobine, was the coloring matter of the blood; but although iron plays an important part in respiration and in the changes of the color of the blood which take place in the various functions of nutrition, and although the iron is specially a constituent of the hematine factor of hemoglobine, it does not perform the functions connected with oxidation and with dioxidation except when in combination with that proteid body; in other words, except as it forms a part of the body called hemoglobine. The exact nature of the proteid constituent has not been precisely determined, but has been regarded as the globuline(q.v.) of the older physiologists; whence the name hemoglobine, contracted from hematoglobuline. Hematine is therefore regarded as a derivative of hemoglobine, and not as a true proximate principle. Hemoglobine obtained from the rat, guinea-pig, squirrel, hedgehog, horse, dog, cat, and goose, crystallizes readily, in slender four-sided rhombic prisms. Those from the blood of the guinea-pig are rhombic octahedrons. Those of the squirrel are six-sided plates. Hemoglobine obtained from the blood of the ox, sheep, rabbit, pig, and man, crystallizes with difficulty. The causes of these differences are not known, but may depend upon the slight difference in the proportion of water of crystallization which has been found to exist. The crystals, when examined with the microscope, are of a bright scarlet, like that of arterial blood when viewed with the naked eye, but when the crystals are in mass they have a darker, more purplish appearance; but a solution in water has the same tint as arterial blood. Examined with the spectroscope, a dilute solution is observed to absorb certain rays of light in a peculiar way, a portion of the red end of the spectrum being absorbed, and a larger portion of the blue end; but the most characteristic phenomenon is the appearance of two strongly marked absorption bands between the letters D and E on Fraunhoffer's scale, the narrow band being the most intense, and in extremely dilute solution the only one visible. By increasing the strength of the solution the bands are intensified and broadened, and the absorption spaces at each end of the spectrum also increase, and by further increasing the strength of the solution the bands may be brought together, so as to form one broad band, when the only rays of light which pass through the spectrum will be in the green and red portions, on either side of the combined bands. By still increasing the strength of the solution the green light becomes absorbed, leaving only the red rays to pass through, these being the last to disappear, which accounts for the natural red color of the solution when seen by transmitted light. Carefully prepared crystals of hemoglobine when placed in the vacuum of an air-pump part with a certain quantity of oxygen and change color. The quantity of oxygen given off is definite, 1 gramme of crystals parting with 1.76 cubic centimeters of oxygen. This oxygen is held in a rather loose state of combination, not forming a part of the permanent hemoglobine crystal, as in the following analysis by Hoppe-Seyler of the crystals taken from the blood of the dog: carbon 53.85; hydrogen 7.32; nitrogen 16.17; oxygen 21.84; sulphur 0.39; iron 0.43, with 3 or 4 per cent of water of crystallization. An ordinary solution of hemoglobine contains also a definite quantity of oxygen in a loose state (added to the quantity given in the above analysis), and which under the air-pump is yielded up, the color passing from scarlet to purple (oxyhemoglobine passing to reduced hemoglobine). This excess oxygen may also be discharged by passing hydrogen gas, which causes dissociation between the permanent hemoglobine and the loosely held oxygen. It may be also expelled by the use of reducing agents, such as ammonium sulphide, or an alkaline solution of sulphate of iron. When a reduced solution of hemoglobine is examined by the spectroscope the spectrum is changed from that of the unreduced solution which contains the excess of oxygen. The two absorption bands are absent, their place being occupied by a single, broader, though fainter band, and there is also less absorption at the blue end of the spectrum. Even in strong solutions much bluish light passes through, which explains the bluish color of reduced hemoglobine. When reduced hemoglobine, either in solution or in crystals, is exposed to the air it immediately absorbs oxygen, and if sufficient is present it returns to the state of oxyhemoglobine, each gramme absorbing 1.76 cubic centimeters of the gas. If this proportion of oxygen is not present the reduced hemoglobine takes up all there is, regaining the scarlet of oxyhemoglobine in proportion to the amount of oxygen absorbed. If oxyhemoglobine has been deoxidized by a reducing agent, and this latter is in excess, curious phenomena of alternate change of color will be observed on letting the tube stand for a time and then shaking it with air. When it has become purple, the act of shaking will be immediately followed by a change of color to scarlet. On standing a short time the solution will resume its purple color, again to be changed to scarlet on shaking. This experiment explains the change of color which takes place in the blood while performing its physiological functions in the system and in the lungs, parting and combining with oxygen alternately. The venous blood which is thrown from the right ventricle into the lungs has lost much of its excess of oxygen; its oxyhemoglobine is reduced to

permanent hemoglobine, and it has a dark purplish color. It is only in asphyxiated blood, however, that the excess oxygen is wholly discharged, when the opaque blood looks almost black. In the lungs, where the blood meets with the inspired air, the carbonic acid gas which had been held in solution is given off, and the reduced hemoglobine receives again a quantity of excess oxygen and becomes scarlet in color. The oxygenated blood returns to the heart, whence it is thrown into the arteries, and thence into the capillaries, where an interchange takes place between their contents and the outlying tissue fluids which results in the reduction of the oxyhemoglobine to permanent hemoglobine, and of course a return to the purple color of venous blood. See RESPIRATION and NUTRITION.

HEMOP'TYSIS (Gr. *ptysis*, spitting), expectoration of blood, a very significant and often dangerous symptom of disease of the lungs or heart, in all cases of great importance, and requiring immediate attention, but apt to be viewed popularly with a somewhat exaggerated alarm. It is seldom directly fatal. It is rather as an indication of dangerous disease, than from its immediate danger, that it requires such careful attention; but unquestionably, it is a matter of common prudence to seek medical advice on the appearance of even the slightest tinge of blood in the expectoration from the lungs. The gravity of this symptom depends very much on its cause. The treatment can scarcely be undertaken without a medical examination; but in case of extremity, it may be desirable to know that repeated doses of ipecacuanha (q.v.), carried even up to the emetic effect, have often been found serviceable.

HEMORRHAGE (Gr. a bursting forth of blood), a flux of blood from ruptured arteries, veins, or capillaries. See BLEEDING.

HEMORRHOIDS (Gr. flowing of blood). See PILES, for which disease hemorrhoids is a technical synonym.

HEMP, *Can'nabis*, a genus of plants of the natural order *cannabinaceæ* (q.v.), having the male and female flowers on different plants; the male flowers with 5-partite calyx and 5 stamens; the female flowers with a spathe-like calyx of one leaf, rolled round the ovary and partially split along one side, and two threadlike stigmas. There is only one known species (*C. sativa*), varying considerably, however, from soil, climate, and cultivation. It is an annual plant, a native of the warmer parts of Asia, but has been cultivated in Europe from the earliest historic times, and is now naturalized in many parts of Europe and America. Like flax, it wonderfully adapts itself to diversities of climate, and is cultivated equally under the burning sun of the tropics, and in the northern parts of Russia. It is, however, readily injured by frost, particularly when young; and in many countries where it is cultivated, it succeeds only because their summer is sufficient for its whole life. Hemp varies very much in height, according to the soil and climate, being sometimes only 3 or 4 feet, and sometimes 15 or 20 ft., or even more. Notwithstanding the nettle-like coarseness of its leaves, it is an elegant plant, and is sometimes sown on this account in shrubberies and large flower-borders. The stem is erect, more or less branched; the leaves are 5—9-fingered. The flowers are yellowish green, small, and numerous; the male flowers in axillary racemes on the upper parts of the plant; the female flowers in short axillary, and rather crowded spikes. The female plants are higher and stronger than the male, for which reason the female plants are popularly known in Germany as *mastelhopfen*, and the male as *femelhopfen*, the names been derived from the Latin *mas* and *femella*, and perpetuating an error which probably is as old as the time of the Romans. The stem of hemp is hollow, or only filled with a soft pith. This pith is surrounded by a tender brittle substance, consisting chiefly of cellular tissue, with some woody fiber, which is called the *reed, boon,* or *shove* of hemp. Over this is the thin bark, composed chiefly of fibers extending in a parallel direction along the stalk, with an outer membrane or cuticle. Hemp is cultivated for its fiber in almost all countries in Europe, and in many other temperate parts of the world; most extensively in Poland, and in the center and south of European Russia, which are the chief hemp exporting countries. French hemp is much esteemed in the market, as is also that of England and Ireland, of which, however, the quantity is comparatively inconsiderable. *Bolognese hemp* and *Rhenish hemp* are varieties remarkable for their height; and a fiber of very fine quality, 8 or 9 ft. long, is known in commerce by the name of *Italian garden hemp*. In Britain the cultivation of hemp is almost confined to Lincolnshire, Holderness, and a few other districts of England, of which the moist alluvial soil is particularly suited to it. In cultivating hemp it is very necessary to have the soil so rich, and to sow the seed at such a season, that the plants shall grow rapidly at first, as they thus form long fibers. A crop of short scrubby hemp is almost worthless. The finer kinds of hemp are used for making cloth; the coarser, for sail-cloth and ropes. Hemp sown thin produces a coarser fiber than hemp sown thick. Something also depends on the time of pulling, for the crop is pulled by the hand. When a rather fine fiber is wanted, and the seed is not regarded, the whole crop is pulled at once, soon after flowering; otherwise, it is usual to pull the male plants as soon as they have shed their pollen, and to leave the female plants to ripen their seed, in which case the fiber of the female plants is much coarser. The treatment of hemp, by *retting*, etc., is similar to that of flax (q.v.) The fiber of hemp is generally used for

coarser purposes than that of flax, particularly for sail-cloth, pack-sheet, ropes, and the caulking of ships.

The seed of hemp is produced in great abundance. It is commonly sold as food for cage-birds; and birds are so fond of it, that not only the ripening fields, but the newly sown fields, must be carefully guarded against their depredations. A fixed oil, *oil of hempseed*, is obtained from it by expression, which is at first greenish yellow and afterwards yellow, and has an acrid odor, but a mild taste. This oil is used in Russia for burning in lamps, although the wick is apt to get clogged; also for making paints, varnish, and a kind of soft soap.

Hemp is cultivated in warm countries, not so much for its fiber as for a resinous secretion, which has narcotic or intoxicating qualities. See HASHISH.

Hemp is also used as a therapeutic agent under the name of INDIAN HEMP, or BHANG. In this country it is administered in the form of resinous extract or of tincture; and it is usually prescribed (like opium) for its hypnotic, anodyne, and antispasmodic properties. Although less certain in its action than opium, it possesses these advantages over that drug—that it does not constipate the bowels, create nausea, or check the secretions, and that it is less likely to occasion headache.

The name hemp (Ger. *hanf*) is probably derived, along with the Greek and Latin *cannabis*, from an oriental name, of which one form is the Arabic *kinnub*. The name hemp is often extended with some distinctive prefix to many of the fibers used for ropes and coarse fabrics, a practice which produces not a little confusion. Thus the fiber of *Apocynum cannabium* (see APOCYNACEÆ) is called CANADIAN HEMP, as well as the plant itself; bowstring hemp (q.v.) is the fiber of the species of *sanseviera;* sunn (q.v.) is often called SUNN HEMP; it is also known as BENGAL HEMP, BOMBAY HEMP, MADRAS HEMP, and BROWN HEMP; JUBBULPORE HEMP is the produce of another species of *crotalaria* (q.v.); the fiber of *hibiscus cannabinus* (see HIBISCUS) is called BROWN HEMP and DECKANEE HEMP at Bombay; Manila hemp or abaca (q.v.) is the fiber of a *musa*.

HEMPEL, CHARLES JULIUS, b. Prussia, 1811; studied medicine in Paris, and in 1835 emigrated to New York, where he graduated at the New York university. In 1857 he was made prof. of materia medica in the homœopathic college of Pennsylvania. He has written a number of important manuals and other works on homœpathic practice.

HEMP PALM (*Chamærops excelsa;* see CHAMÆROPS), a palm of China and Japan, the fiber of the leaves of which is much employed in these countries for making cordage. Hats are also made of its leaves, and even cloaks and other garments for wet weather.

HEMS, HOMS, or **HUMS** (Lat. *Emesa*), a city of Syria, is situated about a m. e. of the right bank of the Orontes, in lat. about 34° 44′ n., long. 36° 43′ east. It is 65 m. n.e. of Baalbek and 110 m. w.n.w. of Tadmor (Palmyra). It is clean, compactly built, and surrounded by old walls; and although there are now no ancient buildings remaining, the antiquity of the city is attested by numerous fragments of columns, by several Greek inscriptions, and the foundations of ancient baths with specimens of mosaic pavement. In ancient times it was chiefly celebrated for its splendid temple of the Sun, one of the priests of which, Elagabalus or Heliogabalus, was raised to the imperial throne of Rome. Under the walls of Hems, Zenobia was defeated by the emperor Aurelian in 272 A.D. In 636 the city was taken by the Saracens, when its old Semitic name Hems was revived; and in 1099 the Crusaders rode through its opened gates. Since then Hems has experienced many vicissitudes of fortune, all of which, however, it has survived, and is now the seat of a flourishing trade, and of several manufactures. Pop. between 20,000 and 30,000.

HEMPSTEAD, a co. in s.w. Arkansas, on Little Missouri, Red, and Little rivers, intersected by the Cairo and Fulton railroads; 700 sq.m. Pop. '70, 13,768. The surface is hilly, soil fertile, producing cotton, corn, etc. Co. seat, Washington.

HEMPSTEAD, a township and village in Queens co., N. Y.; pop. '70, of the township, 13,999; of the village, 2,316. The township originally extended n. and s. across Long Island, from the sound to the ocean, but was afterwards divided about midway, and the name Hempstead now belongs to the southern half. It contains the villages of Pearsalls, Rockville Center, Baldwins, Freeport, Garden City, Hempstead, and several smaller villages. There are few manufactures, the population being mainly engaged in farming and market-gardening. The main line and southern central branches of the Long Island railroad pass through the town. The county agricultural fair grounds are in the n. part of the town at Mineola, on the main line of the railroad. The fairs held there have a high reputation for the exhibition of horses, cattle, and poultry, comparing to advantage with the state fairs. On the ocean the island of Long Beach, belonging to the town, has been leased for a long term of years, and is occupied by one of the largest summer hotels near New York. The main hotel building is 900 ft. long, and there are large pavilions and bathing houses, and special railroad trains secure rapid access from New York and Brooklyn. Hempstead village is regularly laid out, with flagged sidewalks, and is lighted with gas. The dwellings are generally of wood, but well-built, and some very elegant. There are 5 churches, the Presbyterian church claiming to be the oldest Presbyterian society in the United States, organized in 1644. The Epis-

copal church has in its possession a charter of incorporation signed by king George II., and some communion plate given by queen Anne. There are two public halls, four engine-houses, with an excellent volunteer fire department, three principal hotels, a steam flour mill, molding mill, and about 20 places of mercantile business.

HEMSTERHUIS, TIBERIUS, a celebrated Dutch philologist, was b. at Groningen, Jan. 9, 1685. He became professor of Greek and of history at Leyden in 1740, where he died April 7, 1766. One of the greatest Greek scholars of his time, Hemsterhuis may be said to have created a new school of Greek philology, to which belong his distinguished pupils Ruhnken and Valkenaer. His editions of the *Onomasticon* of Pollux (1706), of the *Select Dialogues* of Lucian (1708 and 1732), and of the *Plutus* of Aristophanes (1744, by Schäfer, 1811), are his principal literary works. A beautiful picture of his life is given in Ruhnken's *Elogium Hemsterhusii* (Leyd. 1768 and 1789), republished in Lindemann's *Vitæ duumvirorum T. Hemsterhusii et D. Ruhnkenii* (Leip. 1822). From Hemsterhuis's MSS., *Anecdota Hemsterhusiana* (1825) have been edited by Geel, and *Orationes et Epistolæ* (1839) by Friedemann.

HEMSTERHUYS, or HEMSTERHUIS, FRANÇOIS, 1720-90; a Dutch writer on moral philosophy and æsthetics, studied at the university of Leyden, and for many years acted as secretary to the state council of the united provinces. He continued, however, the study of philosophy partly by social intercourse with a few similarly disposed friends, and partly by correspondence with philosophical writers of other countries, mainly with Jacobi. His writings, though not of high speculative worth, are distinguished by elegance of form and by a touch of refined sentiment. His most direct contributions to philosophy are in the department of æsthetics.

HEN. See FOWL, *ante.*

HENAULT, CHARLES JEAN FRANÇOIS, 1685-1770; a French historian, educated at the Jesuit college des Quatre-Nations. Captivated by the eloquence of Massillon, he entered the oratory with the view of becoming a preacher, but after two years' residence he changed his intention, and, inheriting a position which secured him access to the most select society of Paris, he at an early period achieved distinction by his gay, witty, and graceful manners, and by various light poetical pieces, and two discourses which respectively gained a prize at the French academy in 1707, and at the academie des Jeux Floraux in 1708. In 1706 he became councilor of the parliament of Paris, and in 1710 was chosen president of the court of *enquêtes.* He was admitted into the French academy in 1723, and subsequently into the leading literary societies of Europe. After the death of Bernard de Coubert he became superintendent of the household of queen Marie Leczinska, whose intimate friendship he had previously enjoyed. On his recovery in his fiftieth year from a dangerous malady, he professed to have undergone religious conversion and retired into private life, devoting the remainder of his days to study and devotion. His devotion, however, did not prevent his continuing a near friendship with Voltaire. His chief literary work was the *Abrégé Chronologique,* first published in 1744 without the author's name. It is valuable both for popular use and as a work of reference. In the compass of two volumes he has comprised the whole history of France from the earliest times to the death of Louis XIV. His information is for the most part drawn from original sources, and for such a work the number of errors is remarkably small. Besides some other historical works of minor importance, Henault wrote several dramatic pieces of no particular merit. His *Mémoires* published in 1854, are fragmentary and disconnected, but contain many interesting anecdotes and details regarding persons of note.

HENBANE, *Hyoscyamus,* a genus of plants of the natural order *solanaceæ,* having a five-toothed calyx, an irregular funnel-shaped corolla, and a capsule opening by a lid, and inclosed in the hardened calyx. The species are mostly annual and biennial herbaceous plants, and natives of the countries near the Mediterranean sea. The only species found in Britain is the COMMON HENBANE (*H. niger*), which is not uncommon in waste places, and in the neighborhood of towns and villages, particularly in calcareous soils, and on the sandy shores of Scotland. It is an annual or biennial plant, somewhat bushy, about two feet high; with large sinuated or sharply-lobed leaves without leaf-stalks, and large dingy yellow flowers, with brownish-red or purple veins. The whole plant is covered with unctuous hairs, and has a nauseous smell, which gives warning of its strong narcotic poisonous quality. Cases of poisoning by henbane are, however, not rare; but are more frequently owing to the proceedings of quacks, than to any mistake of the plant for an esculent.

The seeds contain in largest quantity the peculiar alkaloid on which the properties of the plant chiefly depend, *hyoscyamia* or *hyoscyamine,* which crystallizes in stellated acicular crystals of a silky luster. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine, henbane is employed both externally and internally. The leaves are the part commonly used; they are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts affected with neuralgia, etc., and are often found to afford relief. An extract of henbane is sometimes employed instead of belladona to dilate the

pupil of the eye. Tincture and extract of henbane are often administered in cases of annoying cough, spasmodic asthma, and other diseases requiring sedatives and antispasmodics. Henbane is also employed to calm mental irritation, and to induce sleep. For many cases, it has one great advantage over laudanum, in not producing constipation. The smoke from the burning seeds of henbane is sometimes introduced into a carious tooth, to relieve toothache.

The other species of henbane possess similar properties. The dried stalks of *H. albus* are used by smoking in Greece to allay toothache.

HENDERSON, a co. in Illinois on the Mississippi, intersected by Henderson river, and the Chicago, Burlington, and Quincy railroad; 366 sq.m.; pop. '70, 12,582. The surface is hilly and to a large extent covered with forests, soil fertile; chief productions: corn, wheat, and pork. Co. seat, Oquawka.

HENDERSON, a co. in w. Kentucky on the Ohio and Green rivers, crossed by the St. Louis and Southwestern railroad; 550 sq.m.; pop. '70, 18,457—5,990 colored. It has a hilly surface and is to a large extent covered with forests. The soil is fertile, producing tobacco, corn, pork, etc. Co. seat, Henderson.

HENDERSON, a co. in w. North Carolina, w. and n. of the Blue Ridge and e. of French Broad river; 350 sq.m.; pop. '70, 7,706—1,208 colored. The surface is rough, and in large part forest land. The valleys are fertile, producing chiefly corn. Co. seat, Hendersonville.

HENDERSON, a co. in w. Tennessee drained by affluents of Tennessee river; 600 sq.m.; pop. '70, 14,217—2,408 colored. It is level, with large forests of oak, chestnut, etc. The soil is fertile, producing cotton, corn, etc. Co. seat, Lexington.

HENDERSON, a co. in n.e. Texas on Trinity and Natchez rivers; 934 sq.m.; pop. '70, 6,786—1654 colored. It has an undulating surface and fertile soil; chief productions: cotton, corn, and pork. Co. seat, Athens.

HENDERSON, a city in Henderson co., Ky., on the St. Louis and Southwestern railroad and the Ohio river; pop. 4,171. It has a court-house, 10 churches, schools, foundries, car-works, grist mills, saw mills, a woolen factory, and a planing mill.

HENDERSON, ALEXANDER (1583–1646), was a Scotch ecclesiastic, who became professor of rhetoric and philosophy at St. Andrews in 1610. He was presented to the living of Leuchars by archbishop Gladstanes, where as his religious principles were antagonistic to those of his parishioners he was for a long time unpopular, but as he later in life changed his views he became one of the most influential ministers of Scotland. He took an active part against Episcopal innovations, and was mainly responsible for the "National Convention" which was publicly signed in Greyfriars church, Edinburgh, 1638. During the troubled times of king Charles I.'s reign, Henderson's influence was greatly felt, in the negotiations for peace between the Scottish ecclesiastics and the court, and he had a personal interview with the king, when he accompanied the commissioners to London, and when Charles visited Scotland in state (1641) Henderson attended him as chaplain, and later on went to Oxford to mediate between the king and his parliament. In 1643 Henderson was elected moderator for the third time in the Edinburgh assembly, and in that capacity presented a draft of the famous "Solemn League and Covenant." He, with Baillie, Rutherford, and others, was sent to London to represent Scotland in the Westminster assembly, when the "Solemn League" with slight modifications passed both houses and became law for the two kingdoms. When in 1646 the king joined the Scottish army and retired with it to Newcastle, he sent for Henderson, and discussed the systems of church government in a number of papers. But Henderson's health was failing; he set off on his return to Scotland, and eight days after his arrival died at Edinburgh, and his death was the occasion of a national mourning in Scotland. Henderson is one of the greatest men in Scottish history, and next to Knox the most renowned ecclesiastic of Scotland. His political genius was great, and he was, as prof. Mason observed, "a cabinet minister without office." He has left a deep mark in the history both of England and Scotland, and the Presbyterian church of to-day owes much to his influence. He is justly looked upon as the second founder of the Scottish Reformed Church.

HENDERSON, EBENEZER, 1784–1858; a Scotch dissenting minister, and a prolific miscellaneous writer. He accompanied the rev. John Paterson to India (1805), and as the East India company would not allow British vessels to convey missionaries to India, Henderson and his colleague were forced to go to Denmark and await the chance of a passage to Serampore. Being delayed, they decided to remain where they were, and Henderson was fixed at Elsinore, and devoted himself to the distribution of Bibles in the Scandinavian countries. In the course of his labors he visited Sweden and Lapland, Iceland, Denmark, and Germany. A greater part of the time he acted as agent for the British and Foreign Bible society. In 1818 he accompanied Dr. Paterson through Russia as far as Tiflis, and in 1822 was asked by prince Galetzen to assist in translating the Scriptures into the various languages spoken in the Russian empire. Returning to England after 20 years foreign labor, Henderson was appointed tutor of the Mission college, Gosport. He succeeded Dr. Harrison, 1830, as professor of oriental languages in Highbury Congregational college, which position he retained until 1850, when he

was forced to resign on account of his infirmities. His last work was a translation of the book of Ezekiel. His linguistic attainments were very great; he made himself acquainted not only with the ordinary languages of scholarship, but also with Hebrew, Syraic, Ethiopian, Russian, Arabic, Tartar, Persic, Turkish, Armenian, Manchoo, Mongolian, and Coptic. The first Bible society in Denmark was organized by him, 1814; he was associated both with the London religious tract society and the society for the propagation of the Gospel among the Jews. He published an account of his travels in Iceland, and amongst many other works was the author of *Biblical Research and Travel in Russia, Divine Inspiration*, and the annotations of many of the Scriptures.

HENDERSON, JAMES PINCKNEY, 1808–58; b. N. C., but passed his life chiefly in Texas and Mississippi. He was a general in the army of Texas during the revolution of 1836; afterwards secretary of state; minister to England, and in same capacity to the United States to secure annexation. He was the first governor after the annexation. He served in the Mexican war, and was presented with a sword by congress. In 1857 he was chosen senator from Texas.

HENDRICKEN, THOMAS FRANCIS, D.D., b. Ireland, 1827; graduated at a college in Kilkenny, and was ordained a Roman Catholic priest in Dublin. He was one of the American mission in 1853, and served in several parishes in Rhode Island and Connecticut. In 1872 he was made bishop of Providence.

HENDRICKS, a co. in w. central Indiana, drained by tributaries of Eel river, and intersected by three railroads; 400 sq.m.; pop. '70, 20,277. It is mostly level, with large forests, and the soil is fertile; chief productions: corn, wheat, pork, and cattle. Co. seat, Danville.

HENDRICKS, THOMAS ANDREWS, b. Ohio, 1819; graduated at South Hanover college, and was admitted to the Pennsylvania bar in 1843. He pursued his profession in Indiana. He became a member of the legislature and of the state constitutional convention; was twice chosen to congress; was commissioner of the general land office, and in 1863 became a U. S. senator. In 1868 he was before the democratic national convention as a candidate for president, but the nomination was given to Horatio Seymour. In 1876 he was candidate for vice-president on the democratic ticket, but was not elected.

HENGSTENBERG, ERNST WILHELM, a celebrated modern German theologian, was b. Oct. 20, 1802, at Fröndenberg, in Westphalia, where his father was clergyman. Prepared by his father for the university, he devoted himself at Bonn chiefly to oriental and philosophical studies, whilst at the same time he took an enthusiastic part in the *Burschenschaften*. Though sympathizing thus in his early years with liberal and rationalistic movements in Germany, soon after going to Basel, in 1823, he came under the influence of the missionary institution there, and, before he had begun the professional study of theology, was drawn into the theological tendency which he afterwards represented. Going to Berlin, in 1824, as theological *privat-docent*, he put himself at the head of a rising orthodox party, and, with most conscientious devotedness, made the scientific defense of their principles the aim of his labors in the university, and through the press. Though known as a theological author only by two little treatises—*Ueber d. Verhältniss d. innern Wortes zum äussern* (1825), and *Ueber Mysticismus, Pietismus und Separatismus* (1826)—he was made, in 1826, extraordinary, in 1828 ordinary, professor; and in 1829, doctor of theology. Through the press, his influence was exerted chiefly as editor of the *Evangelische Kirchenzeitung*, which was begun in 1827, and still combats rationalism even in its mildest forms, seeking to restore the orthodoxy and church discipline of the 16th and 17th centuries. With the same view were written all his principal works; his *Christologie d. A. T.* (3 Bde. 1829–35; 2te Aufl. 1854–57); *Beiträge zur Einleitung ins A. T.* (3 Bde. 1831–39); *Commentar über d. Psalmen* (4 Bde. 1842–45; 2te. Aufl. 1850); *Die Geschichte Bileams u. Seiner Weissagung* (1842); *Das Hohelied Salomonis ausgelegt* (1853); and others are devoted to the defense of the old interpretation and criticism of the Scriptures against the results of modern biblical science in Germany. Hengstenberg's influence in ecclesiastical matters also, which was very great during the reign of the late king of Prussia, was employed in the carrying out of the high Lutheran dogmas of the church, of church-offices, and of the sacraments, by persecution of sectaries, by opposition to the union of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegscheider, De Wette, and other rationalistic teachers in the universities. His latest works were *Evangelium des heil. Johannes* (1869); *Geschichte des Reiches Gottes unter dem Alten Bunde; Das Buch Hiob erläutert* (1870). A number of his works have been translated. Hengstenberg died May 28, 1869.

HENGST AND HORSA. See ANGLO-SAXONS.

HEN'NA, or HINNA, a name originally Arabic, and sometimes found with the Arabic article incorporated in the form *alhenna* or *alkanna*, belongs equally to *Lawsonia inermis* and *L. spinosa*, shrubs of the natural order *lythraceæ*. They differ in little, but that the one is unarmed and the other thorny, the latter being also the larger plant. Many botanists unite them into one species, under the name *L. alba*. Henna grows in moist situations throughout the north of Africa, Arabia, Persia, and the East Indies. It is cultivated in many places for the sake of its flowers, which are much prized for their fra-

grance, particularly by the Egyptian ladies; but still more for the sake of the leaves, which abound in coloring matter, and which, being dried, powdered, and made into a paste with hot water and catechu, are very generally employed by women throughout the east to stain the nails and tips of the fingers of an orange color; also by men to dye their beards, the orange color being converted into a deep black by indigo; and for dyeing the manes and hoofs of horses, and to dye skins and leather reddish-yellow. Powdered henna leaves form a large article of export from Egypt to Persia, and to various parts of Turkey, from which they find their way to more northern countries, and even to Germany, to be employed in dyeing furs and some kinds of leather. The use of henna for staining the nails appears—from allusions in ancient poets, and from some of the Egyptian mummies—to have prevailed from very ancient times.

HENLE, Friedrich Gustav Jakob, b. Bavaria, 1809, a physician and physiologist; in 1852 professor of anatomy and director of the anatomical institute at Göttingen; noted for the use of the microscope in anatomical research. He has published several works on anatomy and pathology.

HENLEY, John, 1692–1759; an English clergyman known as "Orator Henley," noted for his eccentricities; while at college in Cambridge, Feb., 1712, he under the pseudonym of Peter de Quir addressed a letter to the *Spectator* displaying no small wit and humor. After graduating he became assistant and then head-master of the grammar school of his native town, uniting with these duties those of assistant curate, besides publishing in 1714 a poem entitled *Esther, Queen of Persia*. He also compiled a grammar of ten languages entitled *The Complete Linguist*. Removing to London, he was appointed assistant preacher in Ormond street and Bloomsbury chapels, and in 1723 was presented to the rectory of Chelmondiston in Suffolk; but residence being insisted upon, he resigned both his appointments, and July 3, 1726, opened what he called an "oratory" in Newport market, which he licensed under the toleration act. He introduced many peculiar alterations into his service, and drew up a "primitive liturgy," in which he substituted for the Nicene and Athanasian creeds two creeds taken from the apostolic constitutions; for the Eucharist he made use of unleavened bread and mixed wine; he distributed at the price of one shilling medals of admission to his oratory. He is described by Pope in the *Dunciad* as "preacher at once and zany of his age." Besides his sermons on Sunday he delivered lectures on Wednesday chiefly on social and political subjects; and he also projected a scheme for connecting with the "oratory" a university intended to be the foster-mother of the arts and sciences. For some time he edited the *Hyp Doctor*, a weekly paper established in opposition to the *Craftsman*, and for this service he enjoyed a pension of £100 a year from sir Robert Walpole. At first his orations drew great crowds, but his audience latterly dwindled almost entirely away.

HENLEY-ON-THAMES, a t. of Oxfordshire, England, on the left bank of the Thames, 35 m. w. from London. The Thames is here crossed by a handsome bridge. Henley-on-Thames is on the branch of the Great Western railway. There are several charities, and a reading-room and valuable library, open to all ratepayers, bequeathed by Dean Aldrich of Henley, who died in 1757. Malting is a principal branch of industry; there are also breweries; and there is a considerable trade in corn, flour, and timber. Pop. '71, 4,523.

HEN'NEGAU. See Hainaut, or Hainault.

HENNEPIN, a co. in e. Minnesota, on the Mississippi and Minnesota rivers, crossed by the St. Paul and Pacific, and the Minneapolis and St. Louis railroads; 600 sq.m.; pop. '75, 48,725. The surface is undulating, and dotted with small lakes. The soil is fertile; chief productions: wheat, corn, oats, and butter. Co. seat, Minneapolis.

HENNEPIN, Louis, 1640–1701; b. Belgium; a Roman Catholic (Franciscan) missionary among the American Indians. He preached for some years in Holland, and in 1675 was sent to Canada with La Salle, and bishop Laval. The next year he was in the Indian mission of fort Frontenac, and visited the Mohawk country. Two years later he accompanied La Salle's expedition to Niagara and the upper lakes, and constructed a vessel in which they proceeded by the Erie, Huron, and Michigan lakes, to St. Joseph's river, which they navigated in canoes. Reaching the Illinois, they built fort Crèvecoeur. Here La Salle left them in search of supplies, and Hennepin and his party proceeded down the Mississippi till in April, 1680, they were captured by Sioux Indians and taken to the native villages. During this journey Hennepin discovered the falls of St. Anthony, and one of his party penetrated as far as lake Superior and made a treaty of peace. Not long afterwards Hennepin returned to Quebec and sailed for France where he published his *Description de la Louisiane*, and *Nouvelle decouverte au Sud-ouest de la Nouvelle-France*, containing an account of La Salle's expedition and of the missionary's own discoveries. Hennepin refused to return to America, though ordered to do so by his superiors of the church, and took refuge in Holland. After La Salle's death Hennepin published his *Nouvelle decouverte d'un très grand pays situé dan l'Amerique*. In this he claimed to have been the first man to descend to the mouth of the Mississippi; a statement which was long ago shown incorrect. His works won great popularity and were printed in several languages.

HENOTICUM, an edict of the emperor Zeno, published A.D. 482, and intended to unite the Eutychians with the Catholics. It was procured from the emperor by Acacius, patriarch of Constantinople; and was in the form of a letter, addressed by Zeno to the clergy and the people of Egypt and Libya. As it contained a favorable mention of the council of Chalcedon, it was supposed to favor the Eutychian party; and after much opposition, was at length formally condemned by pope Felix II.

HENRICIANS, or HENRICANS, a sect founded by Henry of Lausanne in the 12th century. Grieved at the corruption of the times, he abandoned the order to which he belonged, and became an earnest preacher of righteousness. His consistent life and the eloquence of his discourses deeply moved the people. At first, Hildebert the bishop favored him, but afterwards drove him from Mans. Joining the disciples of Peter of Bruys in Provençe, he was arrested by the archbishop of Arles, and at the second council of Pisa, 1134, was declared a heretic, and placed in a cell. Subsequently released, he again went to the south of France, where he had great influence over the lower classes. He was arrested by pope Eugenius III., and at the council of Rheims condemned to perpetual imprisonment, but died in prison, 1149.

HENRICO, a co. in e. Virginia between Chickahominy and James rivers, intersected by the Chesapeake and Ohio railroad; 250 sq.m.; pop. '70, 66,179—31,031 colored. The surface is hilly and the scenery picturesque. The chief productions are corn, wheat, and oats. Bituminous coal is found. Co. seat, Richmond (the state capital).

HENRIETTA, ANNA, 1644–70; daughter of Charles I. of England and queen Henrietta Maria; reared by her mother in a convent in France. Louis XIV. was her cousin, but she found no favor in his eyes until her brother Charles II. became reigning king of England. She then (1661) married the only brother of the French king, Philip, duke of Orleans. She was a great favorite at the French court, but her husband treated her with aversion. She died suddenly after intense suffering, and the general belief prevailed that she was poisoned. Bossuet's funeral discourse in her honor is a masterpiece of oratory.

HENRIETTA MARIA, 1609–66; queen consort of England, wife of Charles I. She was a daughter of Henry IV. of France. When the first overtures for her hand were made on behalf of Charles, then prince of Wales, 1624, she was but just 14 years of age. Her brother, Louis XIII., only consented to the marriage on the condition that the English Roman Catholics were relieved from the operation of the penal laws. When, therefore, she set out for her new home in June, 1625, she had already pledged the husband to whom she had been married by proxy on May 1, to a course of action which was certain to bring unpopularity upon him as well as upon herself. That husband was now king of England. The early years of the married life of Charles I. were most unhappy. He soon found an excuse for breaking his promise to relieve the Roman Catholics. His young wife was deeply offended, and the favorite Buckingham did all in his power to promote disunion between the king and queen. After the assassination of Buckingham in 1628, the barrier between them was broken down, and the affection which from that moment united them never lessened. For some years Henrietta Maria's chief interests lay in her young family, and in the amusements of a gay and brilliant court. She loved dramatic entertainments, and her participation in the private rehearsals of the *Shepherd's Pastoral*, written by her favorite Walter Montague, probably subjected her to the savage attack of Prynne. With political matters she scarcely interfered. Even her co-religionists obtained little aid from her until 1637. She then appointed an agent to reside at Rome, and a papal agent, a Scotchman named Con, accredited to her, was soon engaged in effecting conversions amongst English gentry and nobility, but Protestant England took alarm. When the Scottish troubles broke out, she raised money from her fellow Catholics to support the king's army on the borders in 1639. During the session of the short parliament in 1640, the queen urged the king to oppose himself to the house of commons in defense of the Catholics. When the long parliament met, the Catholics were assumed to be the authors of every arbitrary scheme in the plans of Strafford or Laud. Before it had sat for two months, the queen was urging upon the pope the duty of lending money to enable her to restore her husband's authority. She threw herself heart and soul into the schemes for rescuing Strafford and coercing the parliament. The army plot, the scheme for using Scotland against England, and the attempt upon the five members were results of her political activity. In the following year she crossed over to the continent, and in Feb., 1643, she landed at Burlington quay, placed herself at the head of a force of loyalists, and marched through England to join the king near Oxford. After a little more than a year's residence there, April 3, 1644, she left her husband to see his face no more. At Exeter she gave birth to her youngest child who was one day to be duchess of Orleans, and to negotiate the treaty of Dover. Henrietta Maria found a refuge in France. Richelieu was dead, and Anne of Austria was compassionate. As long as her husband was alive the queen never ceased to encourage him to resistance. During her exile in France she had much to suffer. She brought up her youngest child Henrietta in her own faith, but her efforts to induce her youngest son, the duke of Gloucester, to take the same course only produced discomfort in the exiled family. The story of her marriage with her attached servant lord Jermyn, needs more confirmation than it has yet received to be accepted, but all

information which has reached us of her relations with her children point to the estrangement which had grown up between them. When after the restoration she returned to England, she found she had no place in the new court. She received from parliament a grant of £30,000 a year in compensation for the loss of her dower lands, and the king added a similar sum as a pension from himself. In Jan., 1661, she returned to France to be present at the marriage of her daughter Henrietta to the duke of Orleans. In July, 1662, she set out again for England, and took up her residence once more at Somerset house. Her health failed her, and on June 24, 1665, she departed in search of the clearer air of her native country. She died Aug. 31.

HENRIQUEL-DUPONT, Louis Pierre, b. Paris 1797. He entered the studio of M. Pierre Guérin, and after remaining there three years, turned his attention to engraving. His first production, the "Portrait of a Young Woman with her Infant," gained the second medal at the exhibition of 1822. He produced in succession a "Portrait of M. de Pastoret," "Strafford," "The Interment of Christ," after Paul Delaroche; "The Abdication of Gustavus Vasa," after Hersent; "The Disciples at Emmaus," after Paul Veronese, etc.; and is considered the most eminent French engraver of the day. In 1853 and 1855 he received the grand medal of honor, was decorated Aug. 14, 1831, and succeeded Richomme at the *académie des Beaux-Arts* in 1849. He was elected an honorary member of the Royal academy of London in 1869.

HENRY, a co. in Alabama, between Georgia on the e. and Florida on the s.; 930 sq.m.; pop. '70, 14,191. On the e. flows the Chattahooche. The county is fertile, but abounds in immense pine forests. Co. seat, Abbeville.

HENRY, a co. in n.w. Georgia, bounded n.e. by South river; 450 sq.m.; pop. '70, 14,193—6,236 colored. It has a hilly surface, and much forest land. Chief productions: cotton, corn, and wheat. Co. seat, McDonough.

HENRY, a co. in n.w. Illinois, on Rock river, and its affluents intersected by the Chicago, Rock island and Pacific, and two other railroads; 830 sq.m.; pop. '70, 35,413. The surface is mostly prairie, and the soil is fertile. Corn, wheat, oats, cattle, and pork are the main products. Co. seat, Cambridge.

HENRY, a co. in e. Indiana, on Big Blue river and the Pittsburg, St. Louis, and Cincinnati, and the Fort Wayne, Muncie, and Cincinnati railroads; 400 sq.m.; pop. '70, 24,986. The surface is undulating, and much of it is covered with forests. The soil is fertile, producing corn, wheat, oats, and pork. Co. seat, Newcastle.

HENRY, a co. in s.e. Iowa, on Skunk river, traversed by the Burlington and Missouri river railroad; 432 sq.m.; pop. '75, 21,594. It has a prairie and woodland surface, and the soil is fertile. Chief productions: corn, wheat, oats, hay, and pork. Co. seat, Mount Pleasant.

HENRY, a co. in n. Kentucky, s.w. of Kentucky river which is here navigable, and traversed by the Louisville, Cincinnati and Lexington railroad; 220 sq.m.; pop. '70, 11,066—2,438 colored. It has an undulating surface with abundant forests. The soil is fertile; chief productions: tobacco, corn, wheat, and pork. Co. seat, Newcastle.

HENRY, a co. in w. Missouri on Grand river, crossed by the Missouri, Kansas and Texas railroad; 750 sq.m.; pop. '70, 17,401—642 colored. The surface is chiefly prairie, with forests of oak, hickory, etc. Chief productions, corn, wheat, oats, and bituminous coal. Co. seat, Clinton.

HENRY, a co. in n.w. Ohio, on Maumee river, crossed by a division of the Baltimore and Ohio, and the Wabash railroads; 420 sq.m.; pop. '70, 14,028. It has a level surface, and much of it is covered with forests. Corn, oats, and hay are the main products. Co. seat, Napoleon.

HENRY, a co. in w. Tennessee, on the Kentucky border, bounded e. by Tennessee river; 600 sq.m.; pop. '70, 20,380—5,204 colored. The surface is level, and the soil fertile; chief productions: tobacco, cotton, and corn. Co. seat, Paris.

HENRY, a co. in s. Virginia on the North Carolina border, intersected by Smith river; 450 sq.m.; pop. '70, 12,303—5,581 colored. It has a rough surface with large forests. Productions: tobacco, corn, and oats. Co. seat, Martinsville.

HENRY, a post village in Marshall co., Ill., on the Illinois river and a branch of the Chicago, Rock island and Pacific railroad; 33 m. n.n.e. of Peoria; pop. 2,162. It has 8 churches, a bank, a newspaper, and some manufactories. Marshall college, founded in 1855, is the principal institution.

HENRY I., king of England, the youngest son of William the conqueror, was b. in 1068. When his brother, William II., was found dead in the new forest, where they had both been hunting, on Aug. 2, 1100, with a broken arrow in his breast, prince Henry at once seized the reins of government, which, according to the then but imperfectly understood law of primogeniture, should have passed into the hands of his elder brother, Robert, duke of Normandy, who was at the time in Italy, on his way home from crusading in Palestine. Henry was crowned at Westminster, the third day after his brother's violent death. Regarding it he instituted no inquiry, possibly because he was privy to it; and he successfully held the crown against his brother Robert, at first

negotiating with him, and granting him a pension to resign his pretensions, but finally making war upon his badly-governed duchy. Robert was defeated in a bloody battle before the walls of Tenchebray, on Sept. 28, 1106, taken prisoner, and shut up in Cardiff castle during the remaining 28 years of his life. The acquisition of Normandy, the ancient patrimony of his family, had been a point of ambition with Henry, as he despised England and the English; but he had some trouble in keeping it, as the French king, Louis VI., and the counts of Anjou and Flanders, took part with William, Robert's youthful son, whose virtues and misfortunes secured him friends. Henry, however, brought over to himself the count of Anjou, by betrothing his only son to the count's daughter; he rendered neutral, by his eloquence and fair promises, pope Calixtus II., whose intervention in the interests of justice had been besought; and he defeated the French king and his mailed knights in the almost bloodless battle of Brenneville, in 1119. Next year his successes in arms and intrigue were darkened for life by the death of his only son William, who was drowned at sea on his passage from Normandy to England, unregretted by the English, who knew of his hatred towards them, his arrogance, and his gross vices. Henry himself died from a surfeit of lampreys, on Dec. 1, 1135, as he was preparing to leave Normandy, to repress an incursion of the Welsh. He was very anxious that his daughter Matilda, who had married Geoffrey Plantagenet, the boy count of Anjou, on the death of her first husband, Henry V., emperor of Germany, should succeed him on the throne, and had twice made the English nobles swear fealty to her; but on his death the crown was seized by Stephen of Blois, the son of Adela, the conqueror's youngest daughter.

Henry I. was styled Beauclerc, or the scholar, in honor of his learning, which, for a king in his age, was not undeserving of distinction. He had great natural ability, especially in the line of state intrigue. Law was administered with considerable fairness, and not a little rigor, during his reign, and his administrative ability restrained the spirit of rebellion which had been seething incessantly since the conquest. The punishment of crimes during his reign was capricious and barbarous; death, the loss of eyesight (which he is alleged to have inflicted on more than one of his relatives), and perpetual imprisonment, being the most usual penalties of the law.

HENRY II. of England was the grandson of Henry I. by his daughter Matilda, and her second husband Geoffrey Plantagenet, and was b. in 1133. His mother, assisted by her illegitimate brother, the earl of Gloucester, in the early part of Stephen's reign, and towards its close by Henry himself, had made war against Stephen, as a usurper, who had no good title to the throne. In 1153, when the rival armies were drawing near each other, a treaty for a compromise was set on foot, and in the course of it the only son of Stephen having died, it was agreed that Stephen should reign during his life, and that Henry should succeed him, which he did on Stephen's death next year. He was crowned Dec. 19, 1154, along with his queen Eleanor, whom, at the age of 18, he had married within six weeks after she was divorced by Louis VII. of France. She was countess of Poitou, and duchess of Aquitaine, in her own right. Henry inherited from his father Anjou, Touraine, and Maine, and his father and mother succeeded by force of arms, in keeping and taking possession of Normandy for themselves and him; so that, by one method and another, he came to be possessed of a large portion of France as well as England. His chief rivals in power were the clergy, who could use their weapon of excommunication with terrible effect, and who being tried by their own courts were not amenable to the common laws of the realm, and were protected from the punishment due to their crimes, which were too often of the deepest dye. To aid him in reducing the church to subjection to the civil power, he appointed his trusted chancellor, Thomas à-Becket, to the see of Canterbury, and compelled him and the other ecclesiastics to agree to the "constitutions of Clarendon;" a set of laws enacted by a sort of prototype of a parliament, or council of the barons, and having for their object to render the crown and the civil law (such as it had grown to be) superior to the church. Becket, however, proved to be a true churchman, and the long and obstinate struggle between him and his monarch was only terminated by his murder. See BECKET, THOMAS À. Henry did penance at his grave, allowing himself to be scourged by monks; but though the "constitutions of Clarendon" were formally repealed, the king was ultimately successful in reducing the church to subordination in civil matters. During his reign, occurred the conquest of Ireland. That country was then the home of a number of tribes or clans of the ordinary feudal type, and pope Adrian IV., in 1156, by a bull, gave Henry authority over the entire island, and ordered the inhabitants to obey him. He had not leisure at the time to conquer them, but afterwards, English aid being solicited by one of the Irish petty kings, Dermot of Leinster, Henry gave leave to any of his subjects to aid him; and Robert Fitzstephens, constable of Albertivi, Maurice Fitzgerald, and Richard de Clare, surnamed Strong-bow, earl of Strigul, went over with a very few hundred trained Englishmen, and in one year conquered Ireland. They succeeded so well, that Henry became jealous, and recalled them; and next year (1172) he went over himself, to conquer in a royal way, and was everywhere loyally received, except in Ulster. This was the nominal conquest of Ireland, but the majority of the Irish tribes and chieftains continued to be independent barbarians for centuries.

During this reign, also, the first considerable ascendency of England over Scotland

was gained. Henry's sons, incited by their jealous mother, queen Eleanor, rebelled against him, and their cause was espoused by the kings of France and Scotland. The latter, William the lion, was ravaging the n. of England with an army, when he was surprised at Alnwick, and taken prisoner, July 12, 1174. To obtain his liberty, he stipulated to do homage to Henry for Scotland, to cede for ever to him the fortresses of Roxburgh and Berwick, and the castle of Edinburgh for a limited time. In the course of this filial rebellion, Henry, the eldest son, died of a fever, exhibiting great remorse, and Geoffrey was killed in a tournament at Paris. Richard, surnamed Cœur de Lion, with king Philip of France, obtained some advantages over his father. A treaty of peace was concluded between them, of which one of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favorite son John in the list, acting upon a constitution weakened by many cares, threw the king into a fever, of which he died, July 6, 1189.

Upon the whole, Henry was an able and enlightened sovereign. The barons were indeed overawed, but the monarch did not use his power despotically. Law made very great progress in his reign; circuit courts were established, and other improvements effected. The earliest writer on English law, Ranulph de Glanville, was Henry's chief justiciary. In intellect and character, he resembled his grandfather, Henry I., but his violations of the moral law were fewer, and less heinous. Still he had some illegitimate children, his mistress, the fair Rosamond, being the mother of two that are remembered: William Longsword, earl of Salisbury, and Geoffrey, who became archbishop of York, and who was faithful to him when his four legitimate sons took up arms against him.

HENRY III. of England, grandson of Henry II., and eldest son of king John, was b. Oct. 1, 1206, and succeeded to the throne on his father's death at the age of ten. He inherited his father's weakness, and he managed everything ill both at home and abroad. A war with France cost him Poitou, and might have been more disastrous, but for the virtuous disposition of the French king, Louis IX., commonly called St. Louis. In his boyhood, under the direction of the judicious earl of Pembroke, he ratified the magna charta; and he did so in manhood, to appease the discontent of his parliament, and obtain allowances of money. But he kept no vows. He was beset with favorites chiefly from the country of his queen, Eleanor of Provence, and he allowed exorbitant exactions on the part of the clergy and the pope. His misrule roused the people and the barons in parliament, headed by his brother-in-law, Simon de Montfort, earl of Leicester, who forced him to transfer his power temporarily to a commission of barons. He agreed to this by the provisions of Oxford in 1258. The barons were somewhat tardy in reforming the state, and the king desired to regain a power which he alleged, with truth, had been taken from him by compulsion, though wearing the appearance of free-will. The question of the validity of these provisions was submitted by both parties to St. Louis of France, whose conscientiousness was such that foreigners could trust him. He annulled the provisions. Leicester and his party disregarded their agreement to be bound by his judgment, and took up arms against the king. They defeated him, and took him prisoner in the battle of Lewes, on May 14, 1264. The battle was followed by an agreement called the mise of Lewes, more humiliating to the king than the provisions of Oxford. Leicester, being virtually king, summoned a sort of parliament; and to extend his popularity, which was already great, he intimated that boroughs should be represented, and this kind of representation was realized in embryo for the first time in English history. But his supremacy did not last long. Within a year, the powerful earl of Gloucester deserted his party, and enabled prince Edward, the talented son of the king, who had been taken prisoner at Lewes, to escape from captivity. They led an overwhelming army against Leicester, who was defeated and slain at Evesham, on Aug. 4, 1265. The king died on Nov. 16, 1272, and was succeeded by his son Edward. The weakness of Henry and his father had allowed the development of the power of the barons, and the counterpoise of these two forces, regal and aristocratic, was approached in these reigns by a method which has developed into the British parliament. Statute law dates from the time of Henry III.; the "provisions of Merton," passed in the twentieth year of Henry's reign, being the first enactment on the English statute-book.

HENRY IV., of the house of Lancaster, on the deposition of his cousin Richard II. by the parliament, usurped the crown in 1399, in the beginning of which year he had succeeded his father, John of Gaunt, in the duchy of Lancaster. He was surnamed Bolingbroke, from the place (in Lincolnshire) where he was born, in 1366, and had no valid title to the crown, or the pretense of it, except that he was the son of the fourth son of Edward III. The peace of his reign was disturbed by the Welsh, under Owen Glendower (q.v.), and by the Scotch, who were defeated, however, at Nesbit Moor on June 22, and at Homildon hill on Sept. 14, 1402. Henry Percy (surnamed Hotspur), the conqueror in the latter engagement, and his family shortly after broke with the king, and leagued with the Scotch earl Douglas and Glendower against him; but this coalition was destroyed by the battle of Shrewsbury on July 21, 1403. Other two insurrections followed, which were easily suppressed. The king grew to be afflicted with leprosy and epilepsy, and died of a fit in Westminster abbey on Mar. 20, 1413, in the

forty-seventh year of his age, having found a usurped crown to be a heavy burden even for a strong head.

HENRY V., who succeeded his father Henry IV., was b. at Monmouth (whence his surname), in 1388. In his youth he had acquired great military distinction in operations against Glendower, and after his military work was put an end to, through his father's jealousy and distrust of him, he became almost equally celebrated for dissipation. But when he became king (April 21, 1413), he shook himself in great measure free of bad habits and companions, and in an endeavor at the outset of his reign to be both just and generous, he liberated from the confinement in which his father had placed him the young earl of March, who was the true heir to the crown, and restored the son of Hotspur to the lands and honors which his father had lost by rebellion. He paid a tribute to religion also, or rather to the orthodoxy of the age, by persecuting the Lollards by fire and halter. The great effort of his reign was an attempted conquest of France, in which he virtually succeeded. He had no right to the French crown; but in these days of usurpation and unsettled laws of succession, when might and right were practically identical, he seems to have believed sincerely that he had a right. In his first campaign to vindicate it, he besieged and took the town of Harfleur, and gained the battle of Agincourt (q.v.), Oct. 25, 1415, against such enormous odds as to make his victory one of the most notable in history. Two years after, he again invaded France, and made Normandy once more subject to the English crown. An incapable king and civil discord aided him greatly. On May 20, 1420, there was ratified at Troyes "perpetual peace" between Henry and the French. Henry demanded and had conceded to him the regency of France, the eldest daughter of the king and queen to be his queen, and the succession to the French crown on the death of the king. He had hardly returned to England, and been married to this French princess, Catherine, when the defeat at Baugé, in Mar., 1421, of his brother the duke of Clarence, whom he had left governor of Normandy, by a force consisting largely of Scotch, and commanded by the Scotch earl of Buchan, who killed the duke with his own hand, rekindled the hopes of the French, who supported the contention of Charles the dauphin against the treaty of Troyes, to which he had not agreed. Henry returned to France for a third campaign, and his wonted success in arms was following him, when he was seized with illness, and died in a month on Aug. 31, 1422, in the thirty-fourth year of his age, leaving an infant to succeed him, and a splendid reputation for all those qualities that constitute a magnanimous monarch.

HENRY VI., the only child of Henry V. and Catherine of France, was b. at Windsor, Dec. 6, 1421. As he was not quite nine months old when his father died, his uncle John, duke of Bedford, was appointed to govern France, and another uncle, Humphrey, duke of Gloucester, to be "protector of the realm and church of England," with a council appointed by parliament to aid and control him, the parliament declining to appoint him regent, though the late king had desired it. The incapable Charles VI. of France having died, his son the dauphin assumed the title of Charles VII., and went on fighting with the English. His army, commanded by the Scotch earl of Buchan, who had been appointed constable of France for his victory over the duke of Clarence in the previous reign, and consisting of 14,000, half Scotch and half French, was almost annihilated by the English under Bedford, at Verneuil, Aug. 27, 1424. The Scotch auxiliaries ought not to have been there, as peace had been made with the Scots a year before, and their young king, James I., had been set at liberty, after a useful captivity of twenty years, and had returned to his kingdom with lady Jane Beaufort, a daughter of the duke of Somerset, and relation of the royal family, as his queen.

The victory of Verneuil was the last great success obtained by the English in France, and their power, which only force could support or justify, gradually crumbled down. In 1428 they laid siege to Orleans, but the siege was raised next year by the French, inspired by Joan of Arc (q.v.); and although she was burned as a witch by the English in 1431, their power continued to decline. Normandy was completely lost by the fall of Cherbourg in 1450; and ultimately, in 1453, they were expelled from all France (Calais excepted), greatly to the true advantage of both that country and England.

Disputes between Gloucester, the regent, and his uncle, the powerful bishop of Winchester, as well as war with France, prevailed during the minority of the king. As he grew up, he manifested no tendency to either vicious or intellectual activity. He inherited, in fact, the imbecility of his grandfather, Charles VI. of France. In 1445 the weak king found a wife in the strong-minded Margaret of Anjou; and in 1447 the Winchester party, supported by her, succeeded in having Gloucester thrown into prison for high treason, where he was soon found dead in his bed, without external mark of violence, but most likely murdered, as Edward II. had been, by thrusting a red-hot iron through his bowels. Winchester did not long survive his nephew and rival; and in 1450 the duke of Suffolk, the queen's favorite minister, being impeached by the Commons, was condemned to be banished from the kingdom, but was shortly after taken, and executed on board one of the king's ships. The want of strength in the king, as well as in his title to the crown, was an invitation to every form of faction to display itself. Jack Cade, an Irish adventurer, who pretended to be a Mortimer, obtained a temporary possession of London; but the citizens overcame him and his pillaging fol-

lowers, and he was taken and beheaded in a garden by the sheriff of Kent. The true representative of the Mortimers was Richard, duke of York, and he was one of the unquiet spirits of the reign. As a descendant of Lionel, duke of Clarence, the third son of Edward III., his title to the crown was superior to that of the king, who was descended from the duke of Lancaster, the fourth son of that monarch, and he laid claim to the crown with more or less openness, according to circumstances. His influence and address was so great that in 1454, on the occasion of the king's weak mind being entirely eclipsed, he was appointed protector by parliament. On the king's recovery, he was indisposed to give up his power, and levied an army to maintain it. On May 22, 1455, the battle of St. Albans was fought, and the Yorkists were victors; 5,000 of the supporters of the house of Lancaster being killed, the duke of Somerset, the queen's favorite minister for the time, being among them; and the king himself being taken prisoner. This was the first battle of twelve that was fought between the houses of York and Lancaster, in the wars commonly called the wars of the roses, from the emblem of York being a white rose, and of Lancaster a red rose. (For a brief account of the struggle, see EDWARD IV.) Henry, after a checkered career, died May 22, 1471. In his cradle, he was proclaimed king of both France and England; but he lost both, having in intellect scarcely advanced from his cradle all his days, though throughout amiable and pious.

HENRY VII., the conqueror and successor of Richard III., was b. at Pembroke Castle, the seat of his father, the earl of Pembroke, on Jan. 21, 1456. His father, Edmund Tudor, was the son of Owen Tudor, and of his wife, queen Catherine, the widow of Henry V. His mother was a granddaughter of John of Gaunt, parent of the house of Lancaster, and through her he derived his right (such as it was) to the crown. He was, indeed, the nearest heir, after Richard III. had murdered his nephews, the sons of Edward IV., except their sister Elizabeth, and Richard himself. The popular detestation against Richard's crimes was so great in England, that Henry VII., while residing abroad and bearing the title of earl of Richmond, was invited to invade England, and rescue it from the tyrant. On Aug. 7, 1485, he landed at Milford Haven, and marched across the country to Bosworth, in Leicestershire, where a battle took place on Aug. 22, in which Richard was slain. Henry VII. now ascended the throne. His reign was troubled by several impostors claiming the crown: first, Lambert Simnel, a joiner's son, who professed to be earl of Warwick, was proclaimed king in Ireland, but was defeated at Stoke in 1487, taken prisoner, and turned into a scullion in the king's kitchen by Henry VII., who had a talent for turning everything to the most profitable purpose; second, Perkin Warbeck, who pretended to be the boy duke of York, who had *not* been murdered in the tower by Richard III., and was patronized by the duchess of Burgundy, and supported by James IV., of Scotland, but was finally captured; and third, Ralph Wulfurd, who also pretended to be earl of Warwick, but did not succeed in carrying his enterprise far, being almost at once taken and hanged in 1499. In this year Henry VII., apparently to free himself from further trouble from pretenders, had Warbeck, whom he had pardoned, and the true earl of Warwick, a youth who had known captivity only all his days, convicted of a plot to recover their liberty, and executed. The execution of the latter is the chief blot in Henry VII.'s conduct, but his execution of lord Stanley, who had helped him to the throne, also showed a callous heart. Indeed this king was cunning and selfish, but prudent and not intemperate in revenge or in any vice except avarice, which led him to sell offices and pardons, commuting sentences passed by his corrupt and infamous exchequer judges, Empson and Dudley. His avarice kept him from engaging in foreign war, a very small quarrel with France being all that he attempted in that way. It also kept him from returning the dowry of Catharine of Aragon, who had married his son Arthur, prince of Wales, a boy of 14, just before he died, and led him to betroth her to his next son, who became Henry VIII., a betrothal from which flowed most important consequences. He married his eldest daughter, Margaret, to James IV., of Scotland, foreseeing that it might bring about a union of the crowns, and this was one of the most fortunate and prudent schemes of his reign. His wife having died, he was engaged looking out for another for himself, with a large dowry, when he died of consumption, on April 22, 1509. Bacon wrote a history of his reign, in which he represents him as a wise king, but does not conceal his avarice, explaining it rather by observing that the necessities and shifts of other great princes abroad set off to him the felicity of full coffers. Hume reckons his reign "the dawn of civility and science in England. Bacon says, that in it "justice was well administered, save when the king was partie." Some fresh light is thrown upon this and the preceding reign by the recent publication of state papers.

HENRY VIII., king of England, second son of Henry VII. and Elizabeth of York, was b. in 1491. On the death of his elder brother Arthur in 1502, he became heir-apparent to the throne. In his 12th year, he was betrothed to his brother's widow, Catharine of Aragon, sister of Philip I. of Spain, thus early commencing a union afterwards so fertile in evil-fortune. On his father's death, in 1509, Henry VIII. was found to possess many accomplishments with no practical ability. Leaving Dudley and Empson, the instruments of his father's economic extortions, to fall a sacrifice to popular indignation, he proceeded to squander his treasures to his own high satisfaction, and to

the great content of his people. He indolently allowed his ministers to manage everything for him, even to his marriage with Catharine. But if he knew nothing of the foreign relations of the kingdom, he could speak several languages with ease; and if he despised domestic business, never was there a monarch who presided more gracefully in the court, or behaved more gallantly at the jousts or in the hunting-field. His tastes were otherwise innocent enough. He was passionately fond of music and of display, and he indulged in no other excess than that of physical exercise, sometimes, it is said, exhausting four or five horses in the field in one day. It is especially noteworthy, that the early years of the king were spent with scarce a stain on the purity of his life.

For the first 20 years of his reign, England had no reason to be dissatisfied. The period, indeed, was not an eventful one. In the beginning of it (1513) there were two short wars—one with France, in which Terouenne and Tournay were taken, and one with Scotland, in which the victory of Flodden was won. The following years were of that calm which comes before the storm. Wolsey was then minister; and from 1515, when he was made archbishop of York and chancellor, till his fall in 1529, he is wholly responsible for the government, and it was the best governed portion of Henry VIII.'s reign. The foreign policy, it is true, was somewhat tortuous, guided to some extent, perhaps, by the aspirations of the cardinal to the triple crown; and it may be that, in his home-government, Wolsey often exhibited a Jesuitical preference for accomplishing honest ends by dishonest means. The country, notwithstanding, was kept free from foreign embarrassments, and at home justice was administered.

Of the king, it cannot be said that during this period he did anything of consequence. When satiety and diminished means had checked the pursuits of his youth, he had betaken himself to those well-known theological studies which earned for him (1521) the honor of defender of the faith. His book, in defense of the seven sacraments, against Luther, although a work of some erudition, contributed nothing to the solution of the questions it touched. Timidity in examining received opinions was accompanied by corresponding vigor in denouncing those who, possessed of more courage, had proceeded from examination to dissent.

It is impossible not to connect these theological studies with the origin of the suit between Henry VIII. and Catharine. The joyous temperament of Henry VIII. had passed away, and in its place had come discontented gloom. In his now superstitious mind the fancy dwelt, that the early deaths of all his male children had been the judgment of Providence on some sin. From these dark thoughts the queen had not the power of weaning him. Older by 6 years than he was, her beauty had faded, and, haughty in her manners, she exacted all the stately etiquette of the Spanish court from one who had at no time felt for her more affection than was due to a bride selected for him by others. The nation, too, had grown dissatisfied with the union. The prospect of a succession left to be disputed around the person of a girl—the princess Mary, who was the immediate heiress to the throne—was viewed with anxiety. Men remembered the horrors of the wars of the Roses, and feared that their children might see them repeated. The doubt as to the validity of Henry VIII.'s marriage with his brother's widow, which had been started at the time of its celebration, was one certain to be revived on the slightest occasion. A strange mixture of public spirit, religious or superstitious feeling, and selfish desire, now determined Henry VIII. to seek a divorce.

In suing for the divorce, the king unexpectedly found a zealous assistant. Wolsey saw in it a means of detaching England from the alliance with Spain, odious to him as the power that thwarted his ambition, and ruled the papacy while pretending to obey it. Already his acute mind saw that the influence of the priesthood was decaying. Enthusiast as he was, he believed he could restore it. While sounds of reformation were echoing from Germany from beyond the walls of the church, Wolsey, almost alone in England, saw the danger; but he believed there was strength enough within the church to accomplish her own amendment, and he trusted now that the lost affections of the people might be brought back by a gracious exercise of the dispensing power, freeing them from a felt danger. Already the active schemer had arranged that when the work was done, the king should marry a daughter of France, converting an old enemy into a strong ally. With such ends in view, Wolsey (1527) prosecuted the divorce before Clement.

The pope found himself in difficulty. On the one hand, Francis I. supported England; on the other, Charles V. threatened. Clement pursued the traditional policy of Rome, and temporized. To gain time, he issued a commission to cardinal Campeggio and to Wolsey to try the question. Meanwhile, Wolsey's fair projects were rendered impossible. Anne Boleyn had been for many years about court, and when Henry VIII.'s conscience grew too scrupulous to permit his cohabiting longer with Catharine, Anne lived constantly with him. When the king announced his intention of marrying her, Wolsey's desire for the divorce was at an end. The connection promised little to the nation, and he himself had every reason to dislike her, as her relatives belonged to those reformers who sought reform from without, and as such religious sympathies as could find a place in her frivolous mind leaned also to the new learning. He was now as anxious to procrastinate as Clement. The legates' court had been opened, argument had been heard; but on one excuse or another, judgment was delayed, till the changeable Clement revoked the commission, and (1529 A.D.) advocated the cause to Rome.

The revocation of the papal commission to try the divorce question, virtually ended the papal power in England, and the steps that follow are merely the working out of inevitable results. Wolsey, suspected on the best of grounds of having thwarted the divorce, was deprived of power, and a new ministry was formed (Oct., 1529), in which, for the first time, laymen held the highest places. Sir Thomas More was chancellor. The chief adviser of the king was Wolsey's old servant, Cromwell. Parliament was called, and the members, finding that royal approbation was now given to their complaints, made out a formal list of grievances against the clergy. Their humble petition to his majesty set forth how the bishops cared for nothing but the episcopal revenues, and how they converted everything, from the powers of the diocesan courts downwards, into a means of extorting money. The king solemnly sent the document to convocation, and while the reply was under consideration, the commons proceeded. Bills were passed, with little opposition, dealing with what were wont to be thought purely ecclesiastical matters, such as fixing the fees to be exacted in the probate courts, and abating some peculiarly obnoxious imposts made in performing the last ceremonies for the dead. Parliament touched the clergy more closely still when they forbade them to follow secular employments, or to hold pluralities, and enjoined them to live in their parishes and perform their duties. These bills passed the lower house with little opposition; in the upper house, where the spiritual lords were numerous, they passed with difficulty. The king gave his assent willingly. When the bills became law, they were received by the people with great satisfaction.

Though these measures were significant enough of what might follow from his refusal, the pope still delayed. Time was suffered to wear on, and nothing made progress except the unpopularity of the clergy. Rome still showing no symptoms of yielding, the king's political necessities again made him a reformer, and that of a very unscrupulous kind. He imposed a heavy fine on the clergy, under an old statute, for having recognized the legatine authority of Wolsey without express royal sanction. Going still further, the defender of the faith declared himself the head of the church, and induced the clergy to recognize the title in consideration of his graciously remitting a portion of their fine (22 Hen. VIII. c. 15).

Parliament having again met (1530), advantage was taken of the king's disposition still more to limit the clerical power. The clergy had long ago forced the state to give up to them the right to try their brethren when accused of crimes. Their theory was, that he on whom consecration had wrought its mystic office, was too high for the secular arm. The practice was, that every one who claimed the character of clerk, from the highest dignitaries of the church to the crowds of mendicant friars, escaped with small fines after committing the gravest crimes. Parliament was thought to have gone far when it enacted that all below the rank of priest should be dealt with by the ordinary courts of the realm. The same parliament passed other acts, regulating the jurisdiction of the ecclesiastical courts, and making stricter provisions against bequests to the church.

These measures, bold and unusual as they were, affected Rome only indirectly. As it was evident that something to be more closely felt was requisite, one of the pope's highest and most lucrative privileges was attacked. The pope had long maintained that no high ecclesiastical dignity could be conferred without his approval, and in return for granting it, he received the first year's fruits of the benefice. These payments, called annates, amounted to a large sum, increased even beyond its legitimate amount by the dishonorable expedient of sanctioning the appointment of none but very old men. A bill passed both houses abolishing these payments (23 Hen. VIII., c. 20). To make the measure serve its purpose more effectually, power was given to the king to call it into effect at any future time, while the hope was privately held out that this power would not be exercised if the divorce were granted.

While such measures were being passed, it may be believed that sir Thomas More held office with pain and reluctance. Finding at last his influence powerless to restrain the advancing tide of secularism, he resigned, and a ministry was formed (1532) of which Cromwell was now the nominal as well as real head. The new ministry were prepared to push measures of reform as far as the temper of the king and the nation would permit. They desired nothing better than an open rupture with Rome. Henry, on the other hand, exhausted every effort of diplomacy to preserve the alliance with the church. Embassies, intrigues, plots of all kind, in Paris and Rome, abounded in endless confusion at this time, making it impossible to determine the immediate cause of the separation, long since certain to ensue.

In the beginning of 1533, Henry either impatient at the long delay, or as others say, and as the dates render not improbable, discovering that an illicit intercourse he carried on with Anne Boleyn had resulted in her pregnancy, was privately married to her. Within three months afterwards, the marriage was made public; and to complete matters, Cranmer, recently appointed archbishop of Canterbury, held a court, as the highest ecclesiastical authority in England, and pronounced sentence of divorce, declaring the marriage of Henry and Catharine to have been null from the beginning. In England, these doings were accompanied by much rejoicing, and the king's former taste for pageantry revived in the magnificent ceremonial of crowning his new queen.

The news produced other effects in Italy and Germany. When the news of the

marriage reached the vatican, Henry was cited to appear before the papal court. He refused, and appealed to a general council. When Cranmer's sentence reached Rome, the pope at once declared it illegal, and soon after, almost closed the door for further negotiation by rejecting the appeal to the council. The next steps on each side were taken almost simultaneously. The English parliament met, and under Cromwell's guidance, far outdid its predecessors. It passed an act entirely abolishing the papal authority within the realm (24 Hen. VIII. c. 12), giving the king, as on a former occasion, power to call the act into operation when he pleased. It then settled the succession on the issue of Anne Boleyn, to the exclusion of that of Catharine. Scarcely had these measures passed, when news came from Rome that the pope had pronounced judgment in the long pending divorce case, finding Henry's marriage to Catharine to have been valid. On the day following Henry called into operation the act abolishing the pope's authority.

Henry having as yet done comparatively little to forfeit his early popularity, the sympathy of most was with him in the steps taken against those of his subjects who were disaffected with these changes. Among these steps, however, were some not easily defended, even according to the standard of the times. Minor victims fell unheeded, but all Europe was shocked when More and Fisher (bishop of Rochester) were put to death for refusing to acknowledge the new succession, and to admit the king's right to the headship of the church. Even Henry's ally, Francis I., remonstrated. The worst effect of the cruelty was the alienation of the German Protestants, who ever afterwards held aloof from Henry in spite of all Cromwell's efforts to cement an alliance. After this and other similar acts, which were not unfrequent, it may be said that Henry never again received human sympathy. He pursued his course, however, aided by those from whom the dust of the conflict concealed his cruelty.

The state of the monasteries having long been a public scandal, Cromwell (1535) sent a commission to examine them. Acting on the reports of the commission, parliament abolished the smaller monasteries, which happened to be at once the weakest and the worst (27 Hen. VIII. c. 28). The disbanded monks made a large addition, both directly and indirectly, to the ranks of the disaffected; and to create further discontent, the swarms of vagabonds who had subsisted on the monastic alms were suddenly thrown for support on the yeomen.

The disaffection burst out in the rebellion known as the pilgrimage of grace (1536). Crowds who had collected in Lincolnshire with hardly a definite aim, dispersed on the promise of redress in a parliament to be held at York. Redress, however, came not, and the crowds again gathered, this time under more skillful leaders, and with more definite purposes. The king's forces sent against them were insufficient. The whole of the north of England was in the hands of the rebels. Their grievances were a strange medley. Complaints of the law regarding the tenure of land were mixed with complaints that low-born men (such as Cromwell) advised the king, that the monasteries were being dissolved, and that the old faith was being altered. Henry, through certain commissioners, again negotiated with the insurgents, and terms were agreed on, the most important of which was a general amnesty, the benefit of which, however, Aske and the other leaders did not receive. The suppression of this rebellion was followed by the dissolution (in 1537) of the larger monasteries (31 Hen. VIII. c. 13).

In the midst of these civil commotions, two events took place, both bearing on the reformation, but of a very different import. An order in council (1537) appointed the English translation of the Bible to be placed in every church, that all might read it. But as if to correct the idea that every one was thus to have the right of judging for himself in religious questions, an act of uniformity was passed. Henry having now broken with many old professions, reduced his new professions to a creed, to be enforced by penalties, if more rational means should fail to commend it to the nation. Certain articles of religion were drawn up, and after some modifications, were framed into those known as the "bloody six articles." The statute (31 Hen. VIII. c. 14) containing these articles—named, with much simplicity, "An act for abolishing diversity of opinions"—is very brief but very formidable. The doctrines were substantially those of the Roman Catholic church. The articles made no pretensions to form a complete or systematic creed; they embodied the points as to which most conflict of opinion prevailed; and formidable, indeed, were the sanctions enforcing them. Whoever denied the first article (that embodying the doctrine of transubstantiation) was to be declared a heretic, and burned without opportunity of abjuration; whoso spoke against the other five articles should, for the first offense, forfeit his property; and whosoever refused to abjure his first offense, or committed a second, was to die like a felon. To this act Cromwell himself fell a victim. He had been silent in face of the combination which carried it; but having secretly used all his influence as a member of government to thwart its execution, by staying proceedings and giving pardons, he lost Henry's confidence, and was put to death.

The last years of the reign of Henry were disturbed with small wars with Scotland and France, inimical to progress. He died on Jan. 28, 1547, unhonored, unmourned; and yet few rejoiced, for his policy had left England so divided at home, so friendless abroad, that no man could look with confidence to the future.

The character of Henry has of late been discussed at greater length than the subject

deserved. The mere recital of the occurrences of his private life is sufficient to justify most of the infamy which tradition has attached to his name. The divorce of Catharine and the marriage of Anne Boleyn have already been told. Within a short time after the birth of the princess (afterwards queen) Elizabeth, Henry's affection for Anne ceased. He suspected her—not, it must be admitted, without ground—of adultery, and after a hurried trial, had her condemned and executed (1536). On the day after the execution, he married Jane Seymour, against whom nothing more is known than that she was the king's partner in this revolting proceeding. Jane Seymour died (1537) in giving birth to Edward VI. The story of Anne of Cleves follows. The marriage, a political one, arranged by Cromwell to connect Henry with the German Protestants, was unfortunate from the beginning. Henry was deceived as to her personal attractions, and (1540) obtained a divorce to free himself. His fifth wife, Catharine Howard, was (1541) within a few months divorced and executed for an adultery well enough established. His sixth wife, Catharine Parr, survived him, and so the catalogue ends. Passing from the domestic circle to that of his immediate associates, Henry is found as incapable of friendship as he was either of feeling or of evoking love. He had three great ministers—Wolsey, More, and Cromwell—all men of high talent and worth, and all on terms of the closest intimacy with the king, yet all in the hour of need thrown aside. Disease and a broken spirit saved Wolsey from a worse fate; but it is little wonder that every Catholic should detest the memory of him who sent More to the scaffold for adhering to opinions which he himself had held shortly before, or that Protestants should execrate the memory of the man who violated justice and consistency to put to death the first great Protestant minister. If such were the mercies he vouchsafed to those who were with him, it may easily be imagined how he dealt with those who were against him. Claims of political necessity cannot excuse the cruelty with which he persecuted every relative of cardinal Pole, from the aged countess of Salisbury to lesser victims. It may, however, be safely admitted, that tradition has exaggerated Henry's cruelties—that there is no truth, for example, in the tale which gives 73,000 as the number of executions in his reign; and it may be further admitted that he did not wantonly commit murders—that he had always before him in his crimes some object, either of misconceived justice, or of policy; but after allowing for everything, enough remains to explain the universal detestation in which Protestant and Catholic have combined to hold his name.

HENRY I., 1005-60; king of France, grandson of Hugh Capet. On the accession of his mother (Constance of Aquitaine) who favored her youngest son (Robert) Henry took refuge at the court of duke Robert II. of Normandy. With the duke's help he soon compelled her to acknowledge his rights. Constance died in 1032, and Henry, by granting the duchy of Burgundy to his brother, secured his good-will. After the death of Robert "the devil," Henry, who had first supported William the bastard, in 1053 and 1054, tried to weaken the power of the Normans. Leaguing himself with the count of Anjou, and calling his brother Eudes into the field, he invaded Normandy from Evreux. When, however, Eudes had been defeated at Mortemer, Henry drew back in haste, and left the Normans to themselves. In 1059 he caused his eldest son Philip to be crowned as joint king, and died in 1060. He was an active prince, with his sword rarely in the scabbard. Henry's acts and character did little to strengthen the monarchy. The Normans were independent of him, with their frontier barely 25 m. w. of Paris; while to the s. his authority was bounded by the Loire, and in the e. the count of Champagne was only nominally his subject. Henry's first wife Maud, daughter (or niece) of Conrad the Salic, died childless; his second, Anne, daughter of Jaroslay, granduke of Russia, bore him two sons—Philip his successor, and Hugh, count of Vermandois.

HENRY II., king of France, was b. in 1518; married Catharine de' Medici in 1533; succeeded his father, Francis I., in 1547. The money which his father left was rapidly squandered among his favorites and mistresses. A revolt in Guienne, where the people had risen against the *gabeleurs*, or collectors of the salt-duty, was the first event that roused the king and court from their slothful ease. This disturbance was, however, speedily put down by Montmorency. Through the influence of the Guises, whose sister, the dowager-queen of James V., sought the aid of France to support her against the ambitious designs of the English government, a French alliance was cemented with Scotland, and war declared against England, which began in 1550 with the recovery of Boulogne, and ended in 1558 with the taking of Calais, after that city had been 210 years in the hands of the English. Curiously enough, while the king tried to put down heresy with fire and sword at home, he made treaties of alliance with the German reformers, and sent an army of 38,000 men to aid Maurice of Saxony against the emperor; and taking the command in person, made himself master of Toul and Verdun, while Montmorency, through the treachery of the garrison, seized upon Metz. After the abdication of Charles V. (1556), and the division of his vast empire between his brother Ferdinand and his son Philip II., Henry seized the opportune occasion of attacking the Netherlands and Italy before Philip II. had time to consolidate his newly acquired powers, but the results of this step were disastrous to France at every point. In Italy, the attack on Naples, made by Guise at the head of 20,000 men, utterly failed

through the pusillanimity of the pope, and the energetic advance of Alva; while in the low countries, the French under Montmorency sustained a total defeat, in 1557, at St. Quentin, where the flower of the French chivalry were either slain or taken captive by the troops of Philip, who were commanded by Philibert-Emmanuel, duke of Savoy.

These reverses were followed by the treaty of Château-Cambresis (1559), in which Henry agreed, in exchange for the restoration of Ham, St. Quentin, and Castelet, and the liberation of Montmorency, to resign nearly all his conquests in the low countries, Piedmont, and southern Italy, including 190 fortresses and strongholds. Shortly after, he was mortally but accidentally wounded in a tournament by count Montgomery, a Scottish nobleman, and capt. of his guard. He died July 10, 1559.

HENRY III., the third son of Henry II. and Catharine de' Medici, was b. in 1551, and succeeded his brother Charles IX. in 1574. On the death of the constable Montmorency, he received the chief command of the army, and his first campaign, fought in his 16th year, was signalized by two decisive victories, gained over the Protestants at Jarnac and Moncontour. In 1573 the intrigues of the queen-regent secured to him the election to the vacant throne of Poland. He failed, however, to secure the attachment of the Polish nobles; and on receiving the tidings of his brother's death, he fled by night from Cracow, and on his return to France, was proclaimed king of that country. His mother and the Guises had little difficulty in persuading him to continue the religious civil war. The union of the Protestants with the party of discontented nobles, headed by the king's brother, the duke d' Alençon, compelled the alarmed sovereign to grant the former the free exercise of their religion, and various other rights. This exasperated the Catholic party, who, headed by Henry of Guise, formed the confederation known as the *Sainte Ligue*, the object of which was not merely to assert the undivided supremacy of Catholicism, but also to secure the reversion of the throne to Guise, and civil war again and again burst out with renewed violence.

Henry availed himself of his intervals of quiet to indulge his own vicious propensities; and while his mother ruled the state, and the Guises were undermining his throne, his days and nights were spent in an alternation of the most dissolute excesses, and the wildest outbreaks of fanaticism. One day he might be seen passing, to the sound of music, through the streets of Paris, accompanied by a band of young men as effeminate as himself, known as the mignons, and surrounded by parrots, monkeys, and pet dogs, while the next day he and his companions would show themselves clad in a penitent's dress, wearing masks, and carrying in their hands scourges, with which they flaggelated one another as they sang aloud penitential psalms.

The assassination of the duke of Guise in 1588 finally aroused the hatred of the nation. The doctors of the Sorbonne declared the people to be relieved of the duty of obedience to the king, and the leaguers dissolved the parliament. Henry, who was now, for the first time, thrown on his own resources—his mother had just died—was distracted by the difficulties of his position; and in his perplexity at hearing that Guise's brother, the duke of Mayenne, had been declared lieut.gen. of the kingdom, threw himself under the protection of Henry of Navarre. The newly reconciled kings advanced at the head of 40,000 Huguenots on Paris, which, although gallantly defended by Mayenne, would probably have had to capitulate, had not the current of events been suddenly checked through the agency of a fanatical young Dominican-brother, named Jacques Clement, who, on Aug. 1, 1589, on pretense of having important tidings to communicate to Henry, killed him by plunging a knife into his body. The murderer was slain on the spot by the royal guard, and his victim died the following day, after having declared his kinsman, Henry Bourbon of Navarre, his successor.

HENRY IV., king of France and Navarre, surnamed "The Great," and "The Good," was born in Bearn in 1553. Henry was the third son of Antoine de Bourbon and Jeanne d'Albret, daughter and heiress of Henry, king of Navarre and Bearn. His father's death placed him under the sole control of his mother and grandfather, at whose court he was trained to the practice of knightly and athletic exercises, and inured to the active habits and rude fare common to the Bernais mountaineers. His mother, who was a zealous Calvanist, was careful to select learned men holding her own tenets for his instructors; and having discovered that a plot was brooding to remove him to Spain by force, to train him in the Catholic faith, she conducted him, in 1569, to La Rochelle, and presented him to the assembled Huguenot army, with whom he participated in the battle of Jarnac. Henry was now chosen chief of the Protestant party, although, on account of his youth, the principal command was vested in Coligny (q.v.). Notwithstanding the defeats which the Huguenots had experienced in this campaign, the peace of St. Germain which followed was apparently most advantageous to their cause, and was speedily followed by a contract of marriage between Henry and Margaret of Valois, the sister of Charles IX. After much opposition on the part of both Catholics and Protestants, the marriage was celebrated with great pomp in 1572, two months after the sudden death of the queen Jeanne, which was probably due to poison, and within less than a week of the massacre of St. Bartholomew. It had been originally intended that Henry was to share the fate of his friends and co-religionists; but his life was spared on condition of his professing himself a Catholic. Three years he remained at the French court, virtually a prisoner; but at length, in 1576, Henry contrived to elude the vigi-

lance of the queen-mother, and escaped to the camp of the Huguenots in Alençon, where, having revoked his compulsory conversion, he resumed the command of the army, and by his address gained several signal advantages, which constrained the king to consent to a peace highly favorable to the cause of the reformers. The death of the duke of Anjou (late Alençon) gave Henry the rank as first prince of the blood-royal, of presumptive heir to the crown, while the murder of Henry III., in 1589, made him, in right of the Salic law, and as the nearest lineal male descendant of the royal house of France, rightful king of France. As a Protestant, lying under the ban of papal excommunication, he was obnoxious to the greater part of the nation; and finding that the dukes of Lorraine and Savoy, and Philip II. of Spain, were prepared, each on his own account, to dispute his claims, he retired to the south until he could collect more troops and obtain reinforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Liguists, who, in their anxiety to circumvent the ambitious designs which Philip II. cherished in favor of his daughter (niece of Henry III.), notwithstanding her exclusion by the Salic law, proclaimed the aged cardinal Bourbon king, with the duke of Mayenne lieutenant-general of the kingdom, and thus still further complicated the interests of their party. In 1590 Henry won a splendid victory over Mayenne at Ivry. In 1593 the assembly of the states-general, by rejecting the pretensions of Philip II., and insisting on the integrity of the Salic law, smoothed Henry's way to the succession, although it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and minister, De Rosny, afterwards duke de Sully (q.v.), formally professed himself a member of the church of Rome. The ceremony of his recantation of Protestantism, which was celebrated with great pomp at St. Denis in July, 1593, filled the Catholics with joy, and was followed by the speedy surrender of the most important cities of the kingdom, including even Paris, which opened its gates to him in 1594. The civil war was not, however, wholly put down till four years later. In the same year, 1598, peace was concluded between Spain and France by the treaty of Vervins, which restored to the latter many important places in Picardy, and was otherwise favorable to the French king; but important as was this event, it was preceded by a still more memorable act, for on April 15, Henry had signed an edict at Nantes, by which he secured to Protestants perfect liberty of conscience, and the administration of impartial justice. Henry was now left at liberty to direct his attention to the internal improvements of the kingdom, which had been thoroughly disorganized through the long continuance of civil war. The narrow-minded policy that had been followed during the preceding reigns had left the provinces remote from the capital very much at the mercy of the civic governors and large landed proprietors, who, in the absence of a general administrative vigilance, arrogated almost sovereign power to themselves, raising taxes, and exacting compulsory services. These abuses Henry completely stopped, and by making canals and roads, and thus opening all parts of his kingdom to traffic and commerce, he established new sources of wealth and prosperity for all classes of his subjects. The mainspring of these improvements was, however, the reorganization of the finances under Sully, who, in the course of ten years, reduced the national debt from 330 millions to 50 millions of livres, although arrears of taxes to the amount of 20 millions were remitted by the king during that period. On May 14, the day after the coronation of his second wife, Mary de' Medici, and when about to set out to commence war in Germany, Henry was assassinated by a fanatic named Ravaillac. Nineteen times before attempts had been made on his life, most of which had been traced to the agency of the papal and imperial courts, and hence the people, in their grief and consternation, laid Ravaillac's crime to the charge of the same influences. The grief of the Parisians was well-nigh delirious, and in their fury they wreaked the most horrible vengeance on the murderer, who, however, had been a mere tool in the hands of the Jesuits, Henry's implacable foes, notwithstanding the many concessions which he made to their order.

Time has strengthened the high estimate which the lower classes had formed of their favorite king, for although his faults were numerous, they were eclipsed by his great qualities. Inordinate love of women was his worst fault, and the cause of much evil in his own and succeding reigns, for his prodigality and weak indulgence to his favorite mistresses, Gabrielle d'Estrées and Henrietta d'Entragues, and his affection for the natural children which they bore him, were a scandal to the nation, and a source of impoverishing embarrassment to the government. As authorities in regard to Henry II., III., and IV., in addition to the general histories of France, the following works may be consulted: Anquetil, *Esprit de la Ligue;* Petitot's *Collection of Mémoires;* De la Saussaye, *Histoire de Blois; Documents de l'Hist. de France;* Matthieu, *Hist. de Henri IV.;* Memoirs and letters of De Thou, D'Aubigné, Pasquier, Duplessis-Mornay; Capefigue, *Hist. de la Réforme et de la Ligue;* Péréfixe, *Hist. de Henri IV.*

HENRY I., 876–936; king of Germany, son of Otto duke of Saxony. Henry was distinguished in early youth for the courage and energy with which he warred against the Slavonic tribes to the east of his native duchy. Otto, who died in 912, appointed Henry his successor, not only as duke of Saxony, but as lord of Thuringia and part of Franconia. Conrad I. stimulated by certain ecclesiastical advisers whom Henry's inde-

pendent bearing towards the church had deeply offended, resisted the claims of the young duke; but he was ultimately left in possession of all the lands over which his father had ruled. After Conrad's death Henry was chosen king by the Franconian and Saxon nobles, and he had not much difficulty in securing the acquiescence of the rest of Germany. For some years Lotharingia or Lorraine had held an uncertain position between the kingdoms of the East and the West Franks, as Germany and France were then called; but at this time duke Giselbert, who was an old friend of Henry, quarreled with Charles the simple, and transferred his allegiance to the German king. For eight centuries afterwards Lorraine remained a part of Germany. From the time of Louis the child, Germany had been tormented by the Hungarians, who were still a savage race, and who had the advantage of fighting on horseback while the Germans resisted them on foot. In 922 a Hungarian chief was captured, and his people were compelled to purchase his release by agreeing to a nine years' truce, on condition that Henry should during this time pay an annual tribute. In the n. districts the Germans had hitherto lived for the most part in small villages or on separate settlements. Henry began building fortified cities throughout Saxony and Thuringia, and in the remaining duchies his example was extensively followed. He also trained his vassals to meet the enemy on horseback, thus giving a strong impetus to the movement which resulted in the institutions of chivalry. When his arrangements were complete he tried his new force in a contest with the Danes and with some Slavonic tribes, whom he utterly defeated. In 933 the Hungarians demanded as usual the tribute which had till then been punctually paid, and when it was refused invaded Thuringia with a great army. Henry twice defeated them, and they were so overwhelmed by this misfortune that they did not enter Germany for some years, and were never again seen in the northern duchies. Having broken the power of his chief enemies, Henry established the marches of Schleswig, of Meissen, and perhaps of Brandenburg. In his home government he acted with great precaution and judgment. The dukes had become so powerful that there was some danger of their altogether overshadowing the throne. Instead of directly forcing them to submission, as was afterwards done by his son Otto, he attached them to his interests by confirming them in many of their rights and by acting as a mediator in their disputes. Towards the close of his life his position was so secure that he resolved to go to Rome and claim the imperial crown. In the midst of his preparations he died.

HENRY II., SAINT, 972–1024; emperor of Germany, grandson of Henry I. He was crowned at Mainz, June 7, 1002. His most determined enemy during the greater part of his reign was Boleslaus II. of Poland, who annexed Bohemia, and during the king's absence in Italy broke into Lusatia and Meissen. Henry hurried back, defeated Boleslaus, in 1005, and granted Bohemia fief to Jaromir, son of the previous duke. Boleslaus, however, continued the war, which was not ended until 1018, when Henry was obliged to conclude peace on terms more favorable to Poles than he would voluntarily have granted. In the midst of this struggle he had to make war on Adalbero, his wife's brother, who seized the archbishopric of Treves, and was protected in his claim by another brother of the empress, the duke of Bavaria. Both were overcome, and deprived of their dignities, although Bavaria was ultimately restored to the elder of the two brothers. Henry also put down rebellions in Flanders and Meissen, and concluded an important treaty with Rudolf III. of Burgundy, whereby after Rudolf's death the country was to be united to Germany. In 1013 Henry went for the second time to Italy, where Harduin had again raised himself to the throne. The usurper was displaced, and in 1014 Henry was crowned emperor at Rome by Benedict VIII.; whom he had confirmed in the papal see in opposition to the anti-pope Gregory. At the request of Benedict the emperor returned to Italy in 1022 in order to drive back the Grecks who were steadily pressing northwards. In this enterprise he associated himself with the Normans, who thus became one of the most important factors in the political life of Italy. Henry was canonized by pope Eugenius III.; and at a later time his wife, Cunigunde, was also ranked among the saints. The church has rarely had a more splendid benefactor than Henry II., whose ruling policy was to counter-balance the power of the great nobles by increasing that of the spiritual princes. He also founded the bishopric of Bamberg, which was placed under the immediate jurisdiction of the pope, and to which he left by will all his treasure and his magnificent allodial possessions.

HENRY III., emperor of Germany, of the Salo-Franconian line, and the son of the emperor Conrad II., was b. in 1017, elected king of the Germans in 1026, duke of Bavaria in 1027, duke of Swabia and Burgundy in 1037, succeeded his father as emperor in 1039, and died in 1056. Henry III., who was possessed of natural abilities, which had been cultivated as far as the age permitted, was one of the most energetic and efficient rulers of Germany. By his vigor he maintained his ascendency notwithstanding the encroachments of the church and the subordination of the princes of the empire. Having summoned a council at Sutri in 1046, he availed himself of the influence which he had acquired in Italy, by his judicious reconciliation of antagonist parties, to secure a recognition of a new pope, Clement II., and thus brought to an end the scandalous dissensions which were disturbing Christianity through the intrigues of three rival popes, Benedict IX., Sylvester III., and Gregory IV. By his energetic

maintenance of the integrity of the empire, he gained opportunities of adding new territories to the imperial states, for having retaliated on the duke of Bohemia for the hostilities which he had carried on against the Poles during the intestine disorders of Poland, his decisive successes compelled the Bohemian duke to acknowledge himself vassal of the empire; while Henry's campaign against Hungary had a similar result, terminating in 1047 in the recognition of the supreme power of the emperor over the kings of Hungary. He also secured powerful vassals in Italy, in the Norman conquerors of Apulia and Calabria.

Henry devoted the short intervals of peace which he enjoyed to the eradication of numerous abuses in the church, but his schemes of ecclesiastical reform were secretly frustrated by Hildebrand, afterwards Gregory VII. (q. v.); and on the sudden death of Henry, who is supposed to have been poisoned, the papal chair was found to have already entered upon decisive measures for its emancipation from imperial influence. Henry distinguished himself as the zealous promoter of learning and the arts, especially music. He also founded numerous monastic schools, over which he placed learned monks of Brittany, and built several churches, and the cathedrals of Worms, Mayence, and Spires, in the last of which he was interred.

HENRY IV., emperor of Germany, the son and successor of the former, was b. in 1050, elected king of the Germans in 1054, during the lifetime of his father, crowned emperor 1084, and died 1106. As he was only 5 years old at the death of his father, the regency was, in accordance with the wishes of the latter, confided to the child's mother, Agnes of Poictiers. Henry's perpetual quarrels with the Saxon princes and peers occupied his best years, and were the principal cause of the subsequent troubles and mortifications which have given a memorable interest to his history. Unhappily for him, he was induced in 1074, after having suffered defeat and various insults at the hands of his Saxon vassals, to appeal to the pope for his intervention; and Gregory VII., who was only too happy to have an opportunity of interfering in the matter, despatched plenipotentiaries to settle the differences in Saxony, and availing himself of the occasion to prosecute his own plans, commanded the king to abstain from the sale and granting of benefices while this quarrel was pending. Before these directions reached Germany, Henry had, however, settled his own affairs by defeating the Saxon insurgents in a great battle at Hohenburg, taken their princes captive, and rebuilt all the strongholds which they had dismantled; while his councilors had prosecuted a vigorous business in the interdicted sale of benefices. Henry not only approved their conduct, but responded to the pope's remonstrances on the subject, and his summons for his appearance at Rome, by declaring, through an assembly of German bishops and abbots, which met at Worms in 1076, that the pontiff was deposed. Gregory VII. retaliated by excommunicating and deposing Henry, and absolving his subjects from all future obedience towards him. The king at first made light of the sentence, but when he found his vassals and princes gradually falling away from their allegiance, while the electors held a diet in which they declared that unless the ban were removed within a twelvemonth, they would deprive him of the crown, he submitted; and accompanied only by his faithful consort and their eldest son, he hastened, under grievous difficulties, in midwinter, to Italy, where he sought the pope. For three days in Jan., 1077, Henry IV., barefooted, and clothed only in the haircloth shirt of a penitent, was compelled to stand without the castle gates of Canossa, exposed to the inclemency of the weather, before the pontiff consented to remove the ban of excommunication.

After this event Henry's courage and resentment speedily revived; and having found adherents among the Lombards, he began a conflict against the papal power, chiefly in regard to the right of investiture, in which he was generally successful. Gregory again excommunicated Henry, who, as usual, retaliated by electing a new pope, Clement III. Hastening over the Alps, he laid siege to Rome. Gregory took refuge in the castle of St. Angelo, and Henry caused himself to be crowned emperor by the anti-pope; but finding that Hermann of Luxemburg had, during his absence, been elected king of Germany, he hastily left Rome to regain his lost power. For the third time Henry crossed the Alps in 1090, and he had already succeeded in raising the fortunes of his friend, Clement III., taken Mantua, and gained many victories over the Guelphic princes and their favorite pope, Urban II., when he suddenly learned that his son Conrad had joined his enemies, and been crowned king at Monza. Henry's despair on hearing of these acts of rebellion nearly unsettled his reason, and having retired to one of his Lombard castles, he remained for several years in seclusion; but at length rousing himself from his lethargy, he returned in 1096 to Germany, where the princes and people now vied with one another to show him their sympathy and good-will. By his own request, his second son Henry, was elected the king of the Germans, and his successor in the empire. This prince, however, having been induced to rise against his father by Pope Pascal II., took him prisoner, and forcibly compelled him to abdicate. The emperor escaped from his prison, and found friends and safety at Liege, where he died, Aug. 7, 1106, while preparing another army to continue the struggle. See, for the lives of Henry III. and IV., Adamus Bremensis, *Historia Ecclesiastica;* Sismondi, *Italian Republics;* and *Europe during the Middle Ages;* Söltl, *H. IV.;* Minckwitz, *Die Büsse Heinrichs des IVten* (1875).

HENRY V., 1081–1125; emperor of Germany. In 1098 his elder brother, Conrad, having forfeited his right to the throne by rebellion, Henry was appointed his father's successor. Six years afterwards he himself rebelled against the emperor. The papal party, with which he allied himself, took for granted that when he mounted the throne, church and state would instantly be reconciled; but their hopes were disappointed. The main point for which Henry IV. had contended was the right of investing the bishops with ring and staff. When Henry V. succeeded him in 1106, pope Pascal II. demanded that this right should be given up, but he replied that he could not resign powers that had been exercised by his predecessors, and the loss of which would imply that the ecclesiastical lands of Germany would be removed from secular control. In 1110 he entered Italy at the head of 30,000 men. Alarmed by this display of force Pascal withdrew his claims, and a day was appointed for the coronation of Henry as emperor. The opposition of the Roman prelates made it impossible for the pope to proceed with the ceremony, whereupon he and his cardinals were made prisoners. Pascal then formally recognized the right of investiture, and Henry received the imperial crown. When the Germans had recrossed the Alps, Pascal renounced the treaty he had concluded, and the emperor was excommunicated. As many of the princes were pleased to find this opportunity for rebelling, Germany again became the scene of confused contests like those which had plunged it in misery during Henry IV.'s long reign. In 1116 the emperor went a second time to Italy and drove Pascal from Rome; and after Pascal's death he caused Gregory VIII. to be appointed pope. The extreme papal party, however, selected Gelasius II., who renewed the sentence of excommunication against Henry. The latter returned to Germany in 1119, and at a diet in Tribur succeeded in allaying the hostility of the more important among his enemies. Pope Calixtus II., who succeeded Gelasius in 1119, now found it necessary to offer a compromise; and the controversy between the empire and the papacy was for the time closed by the concordat of Worms, 1122, in which it was agreed that at every election of a prelate the emperor should have the right of being present either in person or through a representative, and that the chosen bishop, before being consecrated, should receive his lands and secular authority in fief of the crown. So far the advantage rested with the emperor; but the papacy gained by being recognized as a power which had the right of negotiating with the empire on equal terms, and by the acknowledgment of the claim of the church to nominate its own rulers. Notwithstanding this settlement Germany did not long enjoy peace, for a number of petty wars broke out which Henry was not strong enough to quell.

HENRY VI., 1165–97, emperor of Germany, crowned in 1169. He shared the intellectual culture of his time, and was distinguished for the splendor of his political schemes; but he was of a stern disposition, and in order to attain his ends was sometimes guilty of horrible cruelty. Henry the lion, who had been banished to England by Frederick I., returned to Germany after the departure of the latter for the Holy Land. Henry resisted him, but on becoming the reigning sovereign he concluded peace, and hastened to Rome, where he was crowned emperor in 1191. Through his wife Constantia he had a right to the throne of Sicily; but the Sicilian nobles had made count Tancred, an illegitimate son of Constantia's brother, king. After receiving the imperial crown Henry advanced against Tancred, and the whole of southern Italy, except Naples, was quickly in his possession. Before Naples his army was struck by pestilence, and he was forced to return to Germany. There he suppressed various private wars, and compelled Henry the lion to acknowledge his supremacy. The great ransom which he received from Richard I. of England enabled him to fit out a fine army, and with this he descended upon Italy in 1194, and without much difficulty conquered the Sicilian kingdom. Tancred was dead, but he had left a number of relatives, who were so barborously treated that the people were seized with terror, and not even the sentence of excommunication which the pope pronounced against Henry could induce any one to express dissatisfaction with his rule. On his return to Germany it was easy for him, with the prestige which he had now acquired, to enforce submission; and so great was his authority that, in 1196, he endeavored to secure a declaration that the crown should be declared hereditary in his family. Had he lived some years longer he would probably have succeeded, but in 1197 he died in Messina.

HENRY VII., 1282–1313; emperor of Germany, elected in 1308. When he came to the throne Bohemia was subject to Henry of Carinthia, whom the people extremely disliked. The king at once displaced him, and enriched his own family by granting Bohemia, at the request of the Bohemians themselves, to his son John, whose claims were rendered secure by his marriage with Elizabeth, the daughter of Wenceslaus II. For some time no German king had sought the imperial crown; but Henry resolved to revive the traditions which were dying out, and with a view to this result did what he could to compose the differences between the nobles and to gain their allegiance. At this time there were signs of rapid progress among the cities, and had a strong king devoted himself to their interests, he might have established his throne on a solid basis. Unfortunately the easiest way in which Henry could obtain immediate scope for his plans in Italy was to ally himself with the princes against the cities, and this was, in most instances, the course which he adopted. His visit to Italy was

looked forward to with great eagerness by the Ghibellines. He held aloof at first from both the great parties in the state. In 1312 he was crowned emperor in Rome, having previously received the iron crown in Milan. But while he was in Rome, Robert of Naples was there also with a strong army, and in order to obtain adequate support it was necessary for Henry to declare himself on the side of the Ghibellines. He then resolved to conquer Naples, but while advancing on this expedition he died at Buonconvento. It was generally believed at the time that he had been poisoned by a Dominican monk, but this was not proved by satisfactory evidence.

HENRY, surnamed THE LION, duke of Saxony, is the most notable German prince of the 12th century. He was the son of Henry the proud, and was born in 1129. When only ten years of age he lost his father by poison, and for the next seven years his mother, Gertrude, and his grandmother, Richenza, ruled his paternal dominions, while his uncle, Welf (Guelf), administered the hereditary fiefs of Bavaria. In 1146 Henry himself took the reins of government, and at the diet of Frankfort, in the following year, he demanded of the emperor Conrad the restoration of the whole duchy of Bavaria, which had been wrested from his father. This was refused, and Henry at once, in concert with his uncle, had recourse to arms; but his efforts were crushed by the energetic measures of Conrad. After the death of this emperor, however, Bavaria was given up to him by his cousin, the emperor Frederick I. His possessions now extended from the North sea and the Baltic to the shores of the Adriatic. Eastphalia and Westphalia, with Engern, and the old duchy of Saxony from the Rhine to the Elbe, acknowledged his authority. The greater part of Bavaria belonged to him as a hereditary fief, while his Italian vassals in the Guelfic dominions beyond the Alps took the oath of allegiance to him in 1157. In 1166, under the direction of Hartwig, archbishop of Bremen, a league, comprising the bishops of Magdeburg, Halberstadt, and Hildesheim, and the markgrafs of Thuringia and Brandenburg, was formed against him; but the capture of Bremen, and the storming of Oldenburg by Henry, paralyzed its designs. About this time he separated from his first wife, and married Matilda, daughter of Henry II. of England, soon after which event he undertook an expedition to Palestine. During his absence his enemies were not idle, and even the emperor Frederick displayed a decided want of good faith, conduct which Henry, some time after his return, showed he had not forgotten, by quitting the imperial army during an Italian campaign, and thereby causing Frederick to lose the battle of Legnano, and forcing him to conclude a disadvantageous treaty. The emperor was indignant, and at the diet of Spires, in 1178, spoke strongly against the duke. The numerous enemies of the latter again combined against him; he was summoned to appear at three different diets, and refusing, was put under the ban of the empire. By 1182 his fortunes were at so low an ebb that he was forced to ask mercy of the emperor at Erfurt; but all that he could get was permission to retain his hereditary territories of Brunswick and Luneburg, and even this was on the condition of his going into exile for three years. Henry, in consequence, betook himself with his family to England, but returned to Brunswick in 1184, where he lived quietly. On the departure of Frederick for Palestine in 1188, Henry was again necessitated to withdraw to England, but returned in 1189, and after a year's fighting, a peace was concluded between him and his enemies, by which a portion of his former territories was restored to him. He died at Brunswick in 1195. Henry was a brave and generous prince, of indefatigable activity, but obstinate and passionate. What raised him above the princes of his time was his efforts to advance the commerce, industry, and comfort of his people, and to foster literature and science. Compare Böttiger's *Heinrich der Löwe Herzog der Sachsen und Baiern* (Hannov. 1819).

HENRY, surnamed THE NAVIGATOR, a famous Portuguese prince, the fourth son of John I., king of Portugal, was b. at Oporto in 1394, and first distinguished himself at the conquest of Ceuta in 1415. After the death of his father he took up his residence at the t. of Sagres, in Algarve, not far from cape St. Vincent; and while prosecuting the war against the Moors of Africa, his sailors reached parts of the ocean which the navigation of the time had long supposed to be inaccessible. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he erected an observatory, to which he attached a school for the instruction of youthful scions of the nobility in the sciences necessary to navigation. Subsequently, he despatched some of his pupils on voyages of discovery, which resulted at last in the discovery of the Madeira islands in 1418. Henry's thoughts were now directed towards the auriferous coasts of Guinea, of which he had heard from the Moors; and in 1433 one of his mariners sailed round cape Nun, unil then regarded as the furthest point of the earth, and took possession of the coasts as far s. as cape Bojador. Next year Henry sent out a larger ship, which reached a point 120 m. beyond cape Bojador; and at last, in 1440, cape Blanco was reached. Up to this period Henry had borne all the expense of these voyages himself; henceforth, self-supporting societies were formed under his patronage and guidance, and what had formerly been the affair of a single individual, now became the passion of a whole nation. But Henry did not slack personally in his efforts. In 1446 his captain, Nuno Tristan, doubled cape Verd in Senegambia, and in 1448 Gonzalez Vallo discovered three of the Azores. Henry died in 1463, after he had the satisfaction of learning that his mariners had reached as far south as Sierra Leone. See Wap

päus, *Untersuchungen über die Geogr. Entdeckungen der Portugiesen unter* Henry, *dem Seefahrer* (Gött. 1842). See also Barros and Candido Lusitano; Major's *Life of Prince Henry of Portugal* (Lond. 1868); and the same author's *Discoveries of Prince Henry the Navigator* (1877).

HENRY THE DEACON, variously known as of Cluny, Lausanne, and Toulouse. He was born towards the close of the 11th c., abandoned the cloister 1115, on account of the hideous moral depravity of the clergy and church authorities, and commenced his career as itinerant preacher. His first denunciations were uttered at Lausanne; thence he betook himself to France, following in the steps of Peter of Bruys. His character soon made itself felt; his eloquence attracted the people, and no denunciations from the ecclesiastical authorities had any effect in restraining him. At last, Hildebert, bishop of Le Mans, expelled him from his diocese as an agitator, and we next find him in Provence; but in 1134 he was arrested as a dangerous stirrer-up of the people, and condemned by the council of Pisa to imprisonment, which, however, was not of long duration. The last years of his life were spent at Toulouse, where pope Eugenius thought it necessary to take active measures for the defense of his church, and Henry was condemned to prison, and died in obscurity there about the year 1148. His followers were dispersed.

HENRY, CALEB SPRAGUE, D.D., b. Mass., 1804; graduated at Dartmouth, and studied theology at Andover. In 1828 he became Congregational minister at Greenfield, Mass., and in 1833 removed to Hartford, Conn. About 1834 he started *The American Advocate of Peace*, the organ of the peace society. In New York, in 1835, he was pastor of a Protestant Episcopal church, and subsequently professor of moral and intellectual philosophy in Bristol college. In 1837, with the aid of rev. Francis L. Hawks, he established the *New York Review*. Two years later he was professor of history and philosophy in the New York university. Among his numerous works are *Compendium of Christian Antiquities; Moral and Philosophical Essays; Household Liturgy;* and several translations from the French.

HENRY, JOSEPH, LL.D., 1797–1878; b. N. Y.; educated in Albany academy, where he was professor of mathematics in 1826. His attention was turned to electrical experiments, and he published in 1828 results of modifications in the appliance of electro-magnetism which attracted wide attention, particularly in the application of magnetic force at long distances. About this time he invented a machine worked by magnetism, in which he showed that an oscillating iron bar inclosed in insulated copper wire which was automatic in action would oscillate as long as the magnetic force was applied. He demonstrated the remarkable power that might be produced by a small galvanic apparatus, exhibiting in 1829 electro-magnets which possessed a far greater power than any before tried. One such, occupying only a cubic foot of battery space, is capable of supporting 3,500 lbs. In 1831 was successful in an attempt to make a bell ring at the end of a mile of wire. In the same year he published his observations, and claimed to be the originator of the idea that communication with distant places might be made feasible by magnetism, some years before Morse reduced the matter to practice. In 1832 he became professor of natural philosophy in Princeton college. There and in Europe he pursued his investigations and experiments, and made the acquaintance of distinguished scientists. On the establishment of the Smithsonian institution (1834), he was selected as secretary and chief director, holding the position through life. In 1849 he was chosen president of the American association for the advancement of science, and in 1868 he was president of the National academy of sciences. In 1871 he was head of the lighthouse board, in which capacity he introduced valuable improvements in the service. Among his publications are *Contributions to Electricity and Magnetism*, and a great number of papers in the scientific journals, and the reports of the Smithsonian institution. Among his chief contributions to science are the electro-magnet (indispensable to telegraphy), improvements in fog-signals and in coast lights. His observations were also of great service in the lately established signal service. He spent his life in scientific research, without thought of pecuniary profit for himself.

HENRY, MATTHEW, an eminent nonconformist divine, the second son of Philip Henry, one of the 2,000 ministers who left the church of England on the passing of the "act of uniformity," was born at Broad Oak farmhouse, in Flintshire, Oct. 18, 1662. Having qualified himself for the ministry, he began to preach in June, 1686, and in 1687 was settled as pastor of a congregation of dissenters at Chester, where he continued for 25 years. In May, 1712, he removed to a charge at Hackney, near London, having refused two previous invitations from the same congregation. He died of apoplexy, June 22, 1714, while on his return from a visit to his old friends at Chester. He was twice married, and had a large family by his second wife. His principal work is an *Exposition of the Old and New Testament*, in 5 vols. folio, 1710, which was commenced in Nov., 1704, and has been often reprinted. He lived to finish only the Acts of the Apostles. The remainder was completed by various ministers, whose names are given in some of the editions. His first publication, entitled *A Discourse concerning the Nature of Schism*, 34 pages duodecimo, appeared anonymously in 1689. He was also the author of a biographical sketch of his father, 1696; *A Scripture Catechism*, 1702, 8vo; *Communicant's Companion*, 1704, 8vo; *Discourses against Vice and Immorality*, 1705; *A*

Method of Prayer, 1710, 8vo; *Family Hymns;* numerous sermons; and some religious tracts. His miscellaneous works were republished at London in 1830, 8vo.

HENRY, PATRICK, an eminent American orator, was b. in Hanover co., Va., in 1736. His father was a native of Scotland, and a nephew of Robertson, the celebrated historian. In early life, Henry was passionately addicted to angling and hunting, and seemed too indolent to apply himself to any regular occupation. He managed, however, to pick up a good deal of general information, and he seemed to possess by intuition a profound knowledge of human nature in all its various phases. Having failed successively in "store-keeping" and in farming, he at length was induced to try the profession of law. For a few years this seemed to promise no better success than his former occupations had done, but having been employed in 1755 to plead the cause of the people against an unpopular tax, his peculiar talent seemed suddenly to develop itself; his eloquence, untaught except by the inspiration of native genius, thrilled the audience, and held it in rapt attention more than two hours. From that moment to the present day he has been universally regarded as the greatest of American orators. He was a zealous patriot in the war of the revolution, and was one of the most prominent and influential members of the Virginia legislature, when that state was deliberating whether or not to join Massachusetts in forcibly resisting the arbitrary policy of the home-government. Henry was a delegate to the first general congress, which met at Philadelphia in Sept., 1774, and his voice was the first to break the silence of that assembly. His eloquence on that occasion is said to have astonished all his hearers. In 1776 he was elected governor of Virginia, and was afterwards twice re-elected. In 1795 Washington appointed him secretary of state. He died in 1799.

HENRY, PATRICK (*ante*), 1736-99; was a native of Virginia, and the son of a Scotch emigrant. He was so little promising a scholar, that his father was ready to give up his education in despair, but when he was 14 years old he was so impressed with the fervid eloquence of Samuel Davis, a celebrated Presbyterian preacher, that the fire of oratory kindled in his heart. In his business life Patrick was careless and even shiftless, and seldom successful in his undertakings. He was slovenly in dress, and showed no aptitude for business of any kind. Scraping a violin, torturing a flute, following the hounds and relating anecdotes, constituted his ambition. At the time that he married the daughter of a farmer, a Miss Shelton, his business collapsed and he became wretchedly poor. He next tried farming, but had neither the perseverance nor the knowledge that insure success, and after one more of many failures he opened a store, and succeeded in failing sooner than in his earlier ventures. When no customers appeared he would close his store and go fishing. But in his more sensible intervals he studied such books as he could find, and managed to gain a fair idea of the Latin and Greek authors. Having utterly failed in farming and in trade, he made an attempt at the law, and after only a month and a half's study, had the boldness to ask for license to practice. This was granted on the condition that he should extend his studies before undertaking to practice. Practice was not easy to obtain, and the necessities of his family increased. In fact they were supported by his wife's father, who kept a small tavern at Hanover Court-House, Patrick now and then assisting in the duties of the house. But suddenly (in 1763) one of those strokes of fortune that develop intellectual giants overtook him, and he was engaged in the place of a more experienced advocate who refused to undertake the defense in a case, now forgotten, but long known as the "cause of the parsons," of which the main points were as follows: In those days in Virginia the priests or clergy were paid to a great extent in produce, and among their annual receipts were entitled to 16,000 lbs. of tobacco. In 1755 a severe drought occurred, which, following the French-Indian war, greatly reduced the means of the people. On this account the colonial legislature provided that all debts due in tobacco might be paid in money at 16s. 8d. (English money) per 100 pounds. This reduced the income of the ministers about two thirds. A similar law passed in 1758 gave rise to a bitter controversy between the planters and the ministers. The clergy appealed to the king, and the oppressive act was declared void. This brought down upon the clergy almost universal denunciation, the more so because in many instances they had sued for the losses suffered under the illegal act. A test case was heard in Hanover county, and the court decided in favor of the ministers. The trial was crowded, more than 20 of the clergy being on the bench, Patrick's father acting as presiding justice, while a distinguished lawyer stated the case for the plaintiffs. Patrick, upon rising to speak for the other side, commenced a rambling and uninteresting address. The clergy smiled in anticipative triumph, but suddenly his diffidence passed away, a strange change came over him; as a contemporary says, "a mysterious and almost supernatural transformation of appearance:" his form expanded, and the force of his speech "made their blood run cold and their hair rise on end." The ministers left their bench under his withering invective; the jury without hesitation gave a nominal verdict of one penny damages. The excitement was so intense that the audience seized the young orator and bore him in triumph on their shoulders, and thus, at one bound, Patrick Henry rose to the front rank of American orators. There was no lack of clients thereafter, and his prosperity was assured. But he was not satisfied with his legal profession. In 1765 he became a member of the house of burgesses. At the criti-

cal period of the stamp act debate, Henry was comparatively unknown to the assembly, and the rich planters were scandalized at his presumption in offering to address the house upon so important a subject. Henry hastily wrote brief resolutions which set forth that the burgesses and the governor had the exclusive right and power to lay taxes and imposts upon the people of this colony, and that not alone the stamp act, but all acts of parliament affecting the rights of the colonies were unconstitutional and therefore void. A storm of opposition followed; the resolutions were denounced as extreme, impolitic, and dangerous. Henry writes: "Many threats were uttered, and much abuse was cast on me by those who wished submission." Thomas Jefferson attested that "the debate was most bloody." But Henry would not yield. In the debate he startled even the patriots by exclaiming: "Cæsar had his Brutus, Charles the first his Cromwell, and George the third"—here he was interrupted by the presiding officer and members with cries of "Treason! treason!"—"may profit by their example," calmly said the orator, completing the sentence, adding, "If this be treason, make the most of it." The resolutions were adopted by a majority of one. He was now a power in the colony, and replaced the vacillating planters in the leadership. He became the authorized representative of the people against the aristocracy. He rose to higher public duties when the stamp act was repealed, other burdens were laid upon the colonies in the form of duties upon tea and other necessary articles. The opposition to such imposts shown by Henry, Jefferson, and the Lees, brought about the dissolution of the house of burgesses by lord Botetourt, the royal governor. Henry was the leader in preparing the articles of an association to discourage the use of British merchandise. He continued his legal business, and, though wanting in legal education, was wonderfully successful before juries. With Jefferson and others he was ready to precipitate an open rupture with England. In 1773, Henry, Jefferson, Dabney Carr, and the two Lees, originated the committee of correspondence, whose duty it was to spread intelligence among the colonies. Dunmore was then governor, and he at once dissolved the burgesses, who were at once re-elected by the people, and early in 1774 they met again. In Boston the tea had been thrown into the sea, and a collision was to be expected at any moment. The burgesses appointed a day of fasting and prayer, and for this Dunmore again dissolved the body. Then the burgesses convoked an assembly to be chosen by the people, to meet at Williamsburg, Aug. 1, 1774. That body adopted a non-importation agreement, and appointed delegates to a congress to meet at Philadelphia. Henry was one of the delegates, and in that famous assembly he was hailed as the champion of constitutional liberty, and his wonderful eloquence was at once recognized. The main result of the congress was to send a petition to the king, and an address to the people of the mother country. In Mar., 1775, a convention met at Richmond, of which Henry was the moving spirit. His resolutions to organize the militia and put the colony in an attitude of defense met with great opposition. He replied in a burning speech in which occur the memorable words: "There is no retreat but in submission and slavery. Our chains are already forged. Their clanking may be heard in the plains of Boston. The next gale that sweeps from the north will bring the clash of resounding arms. I know not what course others may take, but, as for me, give me liberty or give me death!" Without an opposing voice the resolutions were adopted, and very soon afterwards came the news of the battle at Lexington and Concord. Virginia was ripe for revolt. Dunmore knew this, and privately took away all the powder in the colony. The people took up arms; they were told that the powder would be returned, and 700 men at once disbanded. Henry seized the favorable moment, gathered a force of militia, and marched upon Williamsburg to arrest the royal receiver-general. An agent of Dunmore's met him, and paid him £330 for the powder. Henry was denounced for stirring up sedition, but it was too late to talk of loyalty; the province was aroused, and in June Dunmore took refuge on a man-of-war. A convention assembled at Richmond and appointed a committee of public safety with most extensive powers. Two regiments were raised, and Henry was appointed commander of all the forces to be raised. The first collision was at Great Bridge, where the Virginia militia gained a triumph over drilled British troops, and drove Dunmore back to his ship. Henry should naturally have been the leader of the troops, but the active command was given to col. William Woodford. Henry was disappointed, and resigned. In the convention of May, 1776, when the delegates to the Philadelphia congress were instructed to demand the independence of the colonies, he took an active part. In that year he was chosen governor of Virginia, and was re-elected until 1779, when he was not legally eligible. He returned to the legislature in which he served through the war, and was then once more chosen governor, serving until 1786, when he finally resigned. In 1788 he was a member of the convention to ratify the federal constitution, which he vigorously opposed, chiefly on the ground that it would tend to supersede state rights. In 1795 Washington offered him the position of secretary of state, but he declined. He also declined Adams's offer of the French mission, and a nomination as governor in 1796. He was elected to the state senate in 1799, but did not live to take his seat, dying June 6 of that year.

HENRY, PHILIP, 1631–96; b. London; educated at Westminster and ordained in 1657. He was one of the clergymen who left the English church in 1662 in consequence

of the act of uniformity. For 25 years he maintained silence, but in 1697 was permitted to preach after the king's declaration of liberty of conscience, and occupied the pulpit until his death.

HENRY, ROBERT, D.D., a Scotch historian and divine, was b. at St. Ninians, in Stirlingshire, Feb. 18, 1718. He studied at the university of Edinburgh; and from 1768 till his death in 1790, was one of the ministers of the established church in that city. His *History of Great Britain on a New Plan*—the first volume of which was published in 1771, and the sixth in 1793, after his death—is a respectable performance, and the "new plan" on which it professes to be written—viz., that of embracing the social aspects of successive periods, and thus tracing the progress of civilization in Great Britian—was unquestionably an improvement on anything that had been done before; but the work has no pretensions to critical acumen or even strict accuracy, and consequently is now of little value.

HENRY, WILLIAM, F.R.S., an eminent chemist, was b. in 1774 in Manchester, and d. in 1836 at Pendlebury near that city. After studying medicine in the Manchester infirmary, under the guidance of Drs Percival and Ferriar, Henry attended the lectures of Black, Gregory, etc., in Edinburgh, in the session of 1795–96. After an interval of several years, in which he was chiefly engaged in superintending a chemical business which had been established by his father, he returned to Edinburgh in 1805, and received the degree of doctor of medicine from that university in 1807. From that time till shortly before his death, he devoted himself to the allied subjects of chemistry and medicine. He was the author of nine papers in the *Philosophical Transactions* (chiefly on the chemistry of the gases); and his *Elements of Experimental Chemistry,* in two volumes, which was published in 1799, reached an eleventh edition in 1829, an almost unparalleled success for a purely scientific work. Henry, like Dr. Wollaston, make the results of science, obtained by the most original and difficult researches, the foundation of a splendid fortune, and few persons have contributed more effectually by the application of their discoveries to the promotion of the arts and manufactures. The memoires of the Manchester society are chiefly indebted to him and to Dalton for their high scientific character.

HENRYSON, ROBERT, 1425–1506; an early Scottish poet and author of the first specimen of the pastoral poetry of his country; according to tradition the ancestor of the family of Henryson or Henderson of Fordell, in the county of Fife, one of whom, James Henderson, was king's advocate and justice-clerk in 1494. From various circumstances known about him he must have been born about the year 1425. He seems to have been educated abroad, as his name does not appear in the registers of the university of St. Andrews, the only one then existing in Scotland; and from an allusion in one of his poems, his attention was probably given to the study of law. In 1462 his name appears in the list of members of the newly founded university of Glasgow as "Magister Robertus Henrysone in artibus licentiatus et in decretis Bachalarius." Henryson seems, in addition to teaching, to have practiced at Dunfermline, as a notary public. His decease in or shortly before 1506 is alluded to by Dunbar. Of the writings of Henryson that have come down to the present time his *Testament of Creseide* may be considered the chief. It was composed as a continuation or supplement to Chaucer's *Troilus and Creseide* which was one of the most popular poems in the English language. Henryson resumes the story where Chaucer leaves off, and completes it by inflicting a suitable punishment on the false Creseide. This continuation displays so much skill that it has been included in all the early editions of Chaucer, as if it had been the work of that poet himself. Another poem, *Robene and Makyne,* though short, is remarkable as the first known specimen of pastoral poetry in the Scottish language, while his *Bludy Serk,* is amongst the oldest examples of ballad poetry. His metrical version of 13 of the *Fables of Æsop,* is perhaps the best known of his works. To each fable is appended an application or moral. In these he alludes to the oppressions of the people and the unsettled state of the country during the feeble reign of James III.

HENSHAW, JOHN PRENTISS KEWLEY, D.D.; 1792–1852; b. Conn., and graduated at Middlebury (Vt.) college in 1808. From a Congregationalist he became an Episcopalian, preached a number of years in Brooklyn, N. Y., and went to Baltimore in 1817, where he was 26 years rector of St. Peter's church. In 1843 he was bishop of Rhode Island. Among his works are *Theology for the People, Inquiry Concerning the Second Advent,* and *Lectures on Terms used in the Prayer Book.*

HENSLER, ELISE, b. Switzerland, 1835. At five years of age the family removed to the United States, and became residents of Boston. The child early showed considerable talent as a vocalist, and was sent, when about 15 years old to Milan to study, through the liberality of certain citizens of Boston. She made her *début* in *La Scala* in 1854, with success, and in 1855 supported Mme. La Grange at the academy of music in New York, where she became a favorite. She continued to sing in this country and in Europe, until, in 1868, having attracted the attention of Dom Fernando, ex-king of Portugal, they were married June 10, 1869, Miss Hensler receiving the title countess d'Edla, under which she was espoused.

HENTZ, CAROLINE LEE, 1800–56; b. Mass., maiden name Whiting; married 1825 N. M. Hentz, who became a professor in Chapel Hill college, N. C. She afterwards removed to Kentucky, where she became known as a writer. Her first publication was *De Lara or the Moorish Bride*, a play, for which she received a prize. Her life was passed in several of the southern states. Among her books are nearly a dozen stories which were very popular. Perhaps the best known was *The Mob Cap*.

HE'PAR (Gr. *hepar*, the liver), is the name given by the older chemists to various compounds of sulphur, from their brown, liver-like color; of these, *hepar sulphuris*, which is in reality a mixture of tersulphide of potassium and some oxysalts of potash, is the best known.—HEPATIC, belonging to the liver; as, *hepatic* artery, vein, duct, etc. —HEPATICA. This term has been given by writers on *materia medica* to medicines which effect the liver and its appendages. The hepatica may be employed (1) to modify the secretion of bile; (2) to remove pain of the liver or gall-bladder, or pain and spasm of the gall-ducts; or (3) to relieve enlargement and other affections of the liver.

HEPA'TICÆ, or LIVERWORTS, a natural order of cryptogamous plants, included among mosses by the older botanists. They have generally a leafy stem; more rarely they are expanded into a leaf-like form. The reproductive organs are of two kinds, *antheridia* and *pistillidia*, as in mosses; the spore-cases (capsules, matured pistillidia) have no operculum: open when ripe by 4—8 valves, more rarely by teeth; and generally contain, along with the spores, spiral filaments called *elaters*. Each elater consists of two spiral fibers, which, whilst the spore case is unbroken, remain coiled up together within an oval cell; but when, by the breaking of the mature spore-case, the outer pressure is removed, their elasticity bursts their cells, and as they suddenly extend themselves, they aid in the dispersion of the spores. The hepaticæ are found in situations generally similar to those of mosses, and are widely distributed over the globe; but the greater number belong to warm climates, where they often grow on the bark, and even on the leaves of trees. Some botanists divide hepaticæ into three orders, *Jangermanniaceæ*, *Marchantiaceæ*, and *Ricciaceæ*.

HEPATI'TIS (Gr. *hepar*, the liver), inflammation of the liver. Hepatitis is a rare disease in temperate latitudes, and in tropical climates is often so acute and so rapidly fatal as to admit but little of medical treatment. It is indicated by pain in the right side and shoulder, tenderness on pressure in the right hypochondrium (see ABDOMEN), with enlargement of the liver as detected by the hand and by percussion, often vomiting, always fever, with more or less loss of appetite and a foul tongue. Not unfrequently there is jaundice (q.v.). The disease sometimes ends in abscesses, which may require to be opened externally. The treatment is complicated, and cannot be ventured upon without professional assistance. The other diseases of the liver will be treated of under LIVER, DISEASES OF.

HEPHÆSTION, son of Amyntor, a Macedonian of Pella and friend of Alexander the great. The two were companions in childhood, but beyond this connection we find no evidence of such qualities in Hephæstion as deserved the passionate attachment of Alexander. The king seems never to have been blind to his real character, and to have made a marked distinction between him, as the friend of his private life and his leisure hours, and such men as Craterus whom he could intrust with important enterprises. We do not hear of Hephæstion till 334 B.C., when he accompanied the king on his visit to Troy. Many tales are told of the close intimacy existing between them; for example, when a letter of very delicate and private nature from Olympias was handed Alexander, Hephæstion according to his custom was reading it over his shoulder, when Alexander without uttering a word took his ring off his finger and pressed it on his friend's lips. In the later campaigns of Alexander in Bactria and India, we find Hephæstion charged with important commands. He was rewarded with a golden crown and the hand of Drypetis, the daughter of Darius and sister of Alexander's own wife Statira (324 B.C.). In the end of the same year he died very suddenly at Ecbatana. Alexander tried to relieve his grief by paying the most extravagant honors to his friend. A general mourning was ordered over Asia; at Babylon a funeral pile was erected at a cost of 10,000 talents; and temples were erected to him as a hero.

HEPHÆS'TUS. See VULCAN.

HEP'TAGON, a plane figure of *seven* sides and *seven* angles; when the sides and angles are equal, the figure is a *regular heptagon*. Geometers have hitherto failed to discover a method of inscribing the heptagon in, or of circumscribing it about a circle, and the problem is believed by many to be, like "the trisection of an angle," impossible of solution by the ancient geometry.

HEPTANOMIS, a name given by the Greeks to the interior of Egypt from 30° to 27° n., which comprised nearly all the greatest Egyptian cities and monuments.

HEP'TARCHY, THE, is the name given to seven kingdoms said to have been established by the Saxons in England. See ANGLO SAXONS. The common idea is, that these seven kingdoms were contemporaneous; but all that can be safely asserted is, that England, in the time of the Saxons, was peopled by various tribes, of which the leading occupation was war; and that sometimes one was conquered, sometimes another. At no time was there a counterpoise of power among seven of them, so that they could be

said to have a separate, much less an independent existence. Still, seven names do survive (some authorities adding an eighth). The king of the one that had the fortune to be most powerful for the time being, was styled Bretwalda or ruler of Britain, but in most instances the power of this supposed ruler beyond the limits of his own territory must have been very small. Under Egbert, Wessex rose to be supreme, and virtually swallowed up the others. The following is a brief account of the seven kingdoms commonly said to have formed the heptarchy:

1. Kent, after the battle of Creccanford, in which 4,000 Britons were slain, was abandoned by the Britons, and became the kingdom of their conquerors, a band of Jutes, who had come in 446 A.D. to serve Vortigern, king of the Picts, as mercenaries, under the leadership of Hengist and Horsa, who were little other than pirates. Hengist became king of Kent, and his son Eric or Aesc succeeded him, and from his descendants, the kings of Kent, were called Aescingas. In 796 Kent was conquered by Cenwulf, king of Mercia; and about 823 both were conquered by Egbert, king of Wessex, who appointed his son Ethelwulf king of Kent, which hereafter, though separate in name, was really subordinate to Wessex.

2. Sussex, partially conquered about 477, and wholly, before 491, by Ella the Saxon, who was the first bretwalda of Britain. Sussex submitted to Egbert of Wessex in 828, and his son Athelstane governed it under him.

3. Wessex, though fluctuating in extent, as all the kingdoms did, included Surrey, Hants, the Isle of Wight, Berks, Wilts, Dorset, Somerset, Devon, and part of Cornwall. It was founded about 494 by Cerdic and Cynric his son, "Ealdormen" or leaders of the "old Saxons." King Egbert, who returned from a flight to Gaul in 800, and ruled from that year till his death in 836, was, as a conqueror, the most successful of all these Saxon kings. When he died, his dominions were divided between his sons, Ethelwulf and Athelstane, the former taking Wessex Proper, and the latter Kent, Essex, Sussex, and Surrey. Another Athelstane, who succeeded in 925 to Mercia and Wessex, conquered Exeter, and assumed Northumbria, exacted tribute from the Welsh, and some formal submission from the Britons of the west, as well as the Danes and Scots. He appears occasionally to have held witenagemôtes or Saxon parliaments of subordinate chiefs (*subreguli*), and at one of these, Constantine, king of Scotland, appeared as a *subregulus*. But Athelstane and his successors, as well as his predecessor, Alfred the great, belong to the history of England, as indeed do all the Saxon states and kings after Egbert.

4. Essex, which comprised also Middlesex, if ever independent, was so about 530 A.D.; but early in the 7th c. it became subject to Mercia, and fell with it to Wessex in 823. This state and Sussex and Wessex were founded by the old Saxons; the remaining three by the Angles who came from Holstein, and gave their name to England.

5. Northumbria consisted of Bernicia and Deira, which were at first separate and independent states. The former comprised Northumberland and all Scotland s. of the Forth, and was founded by Ida about 560. The latter comprised Cumberland, Durham, York, and Lancaster, and was founded by Ella the Angle about the same date. These two were united about 655, and as Northumbria, they submitted to Egbert in 829.

6. East Anglia, comprising Norfolk, Suffolk, and Cambridge, was founded about 571 by Uffa, and from him its kings were named Uffingas. In 883 it was conquered by the Danes, and was only restored to Saxon rule by Athelstane in 925.

7. Mercia included the counties in the center of the kingdom, and is said to have been founded by Crida or Creoda in 585. Three-quarters of a century later it was conquered for a time by Northumbria, but it recovered its independence, and retained it until Egbert subdued it. Canute the Dane had it and Northumbria ceded to him in 1016, just before Edmund Ironside's death allowed him to become king of England, and the Danes to obtain the ascendency over the Saxons, for which they had been striving, at intervals, for five generations. Compare Palgrave's *Rise and Progress of the English Commonwealth* (2 vols. Lond. 1832).

HEPWORTH, GEORGE HUGHES, b. Boston, 1833; graduated at Harvard theological school, and became a Unitarian preacher in Nantucket. In 1858 he was pastor of a Boston church; in 1862 chaplain of the union army; 1863 on gen. Banks's staff in Louisiana. After the war (1870) he took charge of the church of the Messiah in New York, but resigned within two years, renouncing the Unitarian faith, and soon afterwards he established in the same city the Congregational church of the Disciples. He resigned this charge in 1878, and went abroad for rest, and to recruit his wasted health. He has been distinguished as a popular lecturer, and is the author of some published volumes, among which are *Whip, Hoe, and Sword*, and *Rocks and Shoals*.

HERA. See JUNO.

HERACLEA, a city of Bythinia (now Eregli in Amadolia) on the s. coast of the Black sea, having a good harbor and considerable trade. In the time of Alexander the great it rose to great prosperity, but in the Roman war against Mithridates it was nearly destroyed. (See Eregli.)

HERACLEA, a city of Sicily, at the mouth of the Halycus (the modern Platani), not far from the promontory now known as cape Bianco. It is distinguished from other Heracleas by the surname of Minoa, which is explained as referring to its founda-

tion by Minos of Crete. Its name frequently occurs in connection with the Carthaginian occupation of Sicily, and it was in the neighboring sea that the Carthaginian fleet was routed by Regulus and Manlius, 256 B.C. The Romans introduced a colony.

HERACLEI'A, an ancient city of Magna Græcia, situated on the right bank of the Aciris (the modern Agri), about 3 m. above the mouth of that river in the gulf of Tarentum. It was founded about 432 B.C., and although under the Romans it became a prosperous, important, and refined city, it never acquired any historical prominence. When it fell into decay is not known, but at the present day little more remains to mark its site than heaps of rubbish. In the neighborhood, besides a large number of coins, ranking among the very finest relics of antiquity, there have been discovered certain bronze tables, known as the *Tabulæ Heracleenses* containing a copy of the *Lex Julia Municipalis* (45 B.C.), and forming one of the principal authorities for a knowledge of the municipal law of ancient Italy. This inscription has been published by Muratori, Savigny, and others.

HERACLEI'DÆ. This term means, in its widest sense, all "the descendants of Heracles" (Hercules), of whatever time, and in whatever district of Greece, but is specially applied to those adventurers who, founding their claims on their supposed descent from the great hero (to whom Zeus had promised a portion of the land), joined the Dorians in the conquest of the Peloponnesus. There were five different expeditions, the last and greatest occurring eighty years after the Trojan war. The leaders of this last were Temenus, Cresphontes, and Aristodemus, sons of Aristomachus. They defeated Tisamenus, son of Orestes, and grandson of Agamemnon, and thus gained possession of Argos, Sparta, and Mycenæ. The other parts of the country quickly submitted to them, and they then proceeded to divide the spoil. Argos fell to Temenus; Lacedæmon to Procles and Eurystheus, the sons of Aristodemus; and Messenia to Cresphontes. This story of the return of the Heraclidæ touches on the historical period, and though there is much of fable and tradition, yet there seems to be also a large substratum of truth in the records.—See Müller's *Dorians*, Thirlwall's and Grote's *Greece*.

HERACLEI'TUS, a Greek philosopher, was b. at Ephesus, in Asia Minor, and flourished about 500 B.C. He is said to have traveled much, and to have been very sorrowfully impressed with the weaknesses of his fellow creatures, whence, according to old traditions, he obtained the nick-name of the "weeping philosopher," in contrast to Democritus, "the laughing philosopher." He died at the age of 60. The result of Heracleitus's researches and meditations was a work on the nature of things, said to have been entitled *Peri Physeōs* (on nature). Such fragments of it as remain were collected and elucidated by Schleiermacher in Wolf and Buttmann's *Museum der Alterthumswissenschaften* (vol. i. part 3, Berlin, 1805). From these, it appears that he considered fire to be the first principle of all phenomena, and the original substance out of which they have all been evolved. Heracleitus was neither a very original nor a very coherent thinker, and his speculations deserve little attention.

HERACLEONITES, called after Heracleon, a Gnostic who flourished 125 A.D. in S. Italy or Sicily. In his system he appears to have regarded the divine nature as a vast abyss in whose *pleroma* were æons of different orders and degrees,—emanations from the source of being. Midway between the supreme God and the material world was Demiurgus, who created the latter, and under whose jurisdiction the lower animal soul of man proceeded after death, while his higher celestial soul returned to the pleroma whence it first issued. Heracleon seems to have received the ordinary Christian scriptures; and Origen has preserved fragments of a commentary by him on St. John's gospel, while Clement of Alexandria quotes from him what appears to be a passage from a commentary on St. Luke's gospel. These writings are remarkable for their intensely mystical and allegorical interpretations of the text.

HERACLES. See HERCULES, *ante*.

HERACLIDES, PONTICUS, a Greek author of the 4th c. B.C., said to have been a disciple of Plato and Aristotle. According to Suidas, the second of these philosophers, on departing for Sicily left his scholars in the charge of Heraclides. The latter part of his life was spent at Heraclea. He is said to have been vain and fat, and to have maintained such state in Athens that the wits changed his name into Pompicus, or the Showy. On one occasion Heraclea was afflicted with famine, and the pythoness at Delphi, bribed by Heraclides, assured his inquiring townsmen that the dearth would be stayed if they granted a crown to that philosopher. This was done; but just as Heraclides was receiving his honor in a crowded assembly he was seized with apoplexy, while the dishonest priestess perished from the bite of a serpent. On his death-bed he is said to have requested a friend to hide his body as soon as life was extinct, and, by putting a serpent in its place, induce his townsmen to suppose that he had been carried up to heaven. The trick was discovered, and Heraclides received only ridicule instead of divine honors.

HERAC'LIUS, a Byzantine emperor (610–641), of splendid but fitful genius, was descended from a line of brave ancestors, and was b. in Cappadocia about 575 A.D. His father, also named Heraclius, was exarch or gov.gen. of Africa. Regarding Heraclius's youth we know almost nothing; but when upwards of 30, he took part in a conspiracy (which proved successful) against the emperor Phocas, whose horrible cruelties

had made him universally detested. In 610 Heraclius, at the head of a fleet, appeared at Constantinople: the citizens rose in rebellion, Phocas was beheaded, and Heraclius saluted emperor in his stead. His fellow-conspirators were richly rewarded. The condition of the Byzantine empire at this time was deplorable. Factions within and the barbarians without had almost reduced it to ruin, so that years elapsed before Heraclius could put forth any vigorous efforts for its reorganization. His most powerful enemies in the north were the Avari, who, in 619, plundered the country to the very gates of Constantinople, nearly captured Heraclius himself, and are said to have carried with them to their homes beyond the Danube 250,000 prisoners. The whole western empire had by this time been seized by the Slaves, Lombards, Visigoths, and other tribes; but by far the most alarming conquests were those made in the east by the Persian king, Chosroës II. In 615 Sarbar, the Persian general, stormed and plundered Jerusalem. The same fate befell Alexandria in the following year, after which all Egypt yielded to the victorious Sarbar, who penetrated as far as Abyssinia. By stopping the export of corn from Egypt to Constantinople, he likewise caused a severe famine in the latter city. In the same year (616) the Persians besieged and captured Chalcedon, opposite Constantinople. Heraclius at first tried to negotiate with his enemies, but, flushed with their triumphs, they refused, and even put his ambassadors to death. Probably the emperor, who was now laying his plans for taking a magnificent revenge on the Persians, was not greatly displeased at their refusal. Having, after a whole year of laborious discipline, organized an army composed of Greeks and barbarians, he, in 622, shipped his troops at the Bosporus, and sailed for Cilicia. Having landed, he encamped in the plain of Issus, completely routed a Persian army dispatched against him, and forced his way through the passes of the Taurus and Anti-Taurus, into the province of Pontus, where his soldiers wintered. In 624 he crossed Armenia, conquered several of the Perso-Caucasian countries, and reached the Caspian sea. Here he formed an alliance with the khan of the Khazars, who ruled over the sterile regions north of the Caucasus, as far as the river Ural. By the assistance of these and other barbarians, he attacked Media, and carried his arms as far south as Ispahan. Before going into winter quarters, he again utterly defeated the main body of the Persians, commanded by Chosroës himself. In 625 Heraclius descended from the Caucasus into Mesopotamia, and thence proceeded into Cilicia, where a sanguinary engagement took place between him and Sarbar; the Persians were routed with immense slaughter, and Sarbar fled to Persia. During the next two years (626–628) the glory of Heraclius culminated. He carried the war into the heart of the Persian empire, and in Dec., 627, cut to pieces the forces of Rhazates, the Persian general, near the junction of the Little Zab and the Tigris. An immense booty fell into the hands of the victors. A few days after, Heraclius took Artemita or Dastagerd, the favorite residence of Chosroës, and here the Arabic historians exhaust hyperbole in attempting to state the enormous treasure which the Byzantine emperor captured. Chosroës fled into the interior of Persia, and was soon afterwards seized, imprisoned, and starved to death by orders of his son and successor, Siroes, who was glad to conclude a peace with Heraclius, by which the Persians gave up all their former conquests. The fame of Heraclius now spread over the whole world, and ambassadors came to him from the remotest kingdoms of the east and west; but a new and terrible enemy suddenly arose in the south. The Arabs, filled with the ardor of a new and fierce faith, had just set out on their career of sanguinary proselytism. The war began during the life of the prophet himself was continued by his successors, Abubekr and Omar. Heraclius no longer commanded the Byzantine forces himself, but wasted his days in his palace at Constantinople, partly in sensual pleasures, and partly in wretched theological disputations. His mighty energies were quite relaxed; and before the close of his life, Syria, Palestine, Mesopotamia, and Egypt were in the hands of the caliphs. He died in 641

HER'ALD (derivation uncertain), an officer whose duty consists in the regulation of armorial bearings, the marshaling of processions, and the superintendence of public ceremonies. In the middle ages heralds were highly honored, and enjoyed important privileges; their functions also included the bearing of messages, whether of courtesy or defiance, between royal or knightly personages; the superintending and registering of trials by battle, tournaments, jousts, and all chivalric exercises; the computation of the slain after battle; and the recording of the valiant acts of the falling or surviving combatants. The office of herald is probably as old as the origin of coat-armor. The principal heraldic officers are designated kings-of-arms or kings-at-arms, and the novitiates or learners are styled pursuivants. Heralds were originally created with much ceremony; they are now appointed by the earl-marshal in England, and by the lyon king-of-arms in Scotland. There are now in England three kings-of-arms, named by their offices Garter, Clarencieux, and Norroy; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants, Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. There have been at different periods other heralds, whose titles are now laid aside; heralds extraordinary have also sometimes been created, as Edmonson, by the title of Mowbray, in 1764. In Scotland the principal heraldic officer is lyon king-of-arms; and there were till lately six heralds—Snowdoun, Albany, Ross, Rothesay, Marchmont, and Ilay; and six pursuivants—Unicorn, Carrick, Kintyre, Ormond, Dingwall, and Bute. By 30 Vict. c. 17, the permanent number of heralds and

pursuivants in Scotland is reduced to three of each. Ireland has one king-of-arms, Ulster; two heralds, Cork and Dublin; and two pursuivants, of whom the senior bears the title of Athlone, and the other is called the pursuivant of St. Patrick.

The official costume of a herald consists of an embroidered satin tabard or surcoat of the royal arms, and a collar of SS. See KING-AT-ARMS, PURSUIVANT, HERALDS' COLLEGE.

HER'ALDRY is properly the knowledge of the whole multifarious duties devolving on a herald (see HERALD); in the more restricted sense, in which we shall here consider it, it is the science of armorial bearings. After occupying for ages the attention of the learned, and forming an important branch of a princely education, the study of heraldry fell, in later times, into neglect and disrepute, and was abandoned to coach-painters and undertakers, a degradation owing in part to the endless tissue of follies and mystifications that had been interwoven with it. Modern criticism has rescued heraldry from the pedantries and follies of the heralds, and imparted to it a new interest, as a valuable aid to historical investigations.

Though we have instances in remote times of nations and individuals distinguishing themselves by particular emblems or ensigns, nothing that can properly be called armorial bearings existed before the middle of the 12th century. The shields of the French knights in the first crusade presented a plain face of polished metal, nor is there any evidence of heraldic devices having been in use in the second crusade in 1147. But the Anglo-Norman poet Wace, who flourished in the latter part of the 12th c., mentions devices or cognizances as being in use among the Normans, "that no Norman might perish by the hand of another, nor one Frenchman kill another;" and Wace is curiously corroborated by the Bayeux tapestry of the 12th c., where there are figures of animals on the shields of the invaders, while the Saxon shields have only borders or crosses. The rude devices on these shields have nothing approaching to an armorial form or disposition, yet it is probable that systematic heraldry sprang out of them, but it is difficult to say when they assumed that hereditary character which is essential to the idea of armorial bearings. Some sort of armorial insignia were depicted on the shields used in the third crusade, which took place in 1189; and in the same half-century originated the fleurs-de-lis of France and the lions of England. The transmission of arms from father to son seems to have been fully recognized in the 13th c., and in the practice then introduced of embroidering the family insignia on the surcoat worn over the hauberk or coat of mail, originated the expression *coat of arms*. Arms were similarly embroidered on the jupon, cyclas, and tabard, which succeeded the surcoat, a practice which survived till the time of Henry VIII., when the tabard came to be entirely disused except by heralds, who still continue to wear on their tabards the royal arms.

It was by slow degrees that the usage of arms grew up into the systematized form which it assumes in the works of the established writers on heraldry. The principal existing data for tracing its progress are English rolls of arms yet extant of the times of Henry III., Edward I., and Edward III. The earliest formal treatises date no further back than the end of the 14th c., before which time the whole historical part of the subject had been obscured by a tissue of gratuitous fictions, which has misled most subsequent writers up to a very recent period. The professors of the science represent the heraldry of the 10th and 11th centuries as equally sharply defined with that of the 15th and 16th. The arms of William the conqueror and his sons are described with all their differences; arms are ascribed to the Saxon kings of England, to Charlemagne, and even to half-mythical persons and heroes of classical times. It is rather surprising to find this fictitious heraldry understood and systematized early in the 14th century. The arms traditionally considered to be those of Edward the confessor were sculptured in Westminster abbey in the reign of Edward II.

In the infancy of heraldry, every knight assumed what arms he pleased, without consulting sovereign or king-at-arm. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims, were all fixed on; and whenever it was possible, the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. There is reason to believe that early arms were generally *armes parlantes*, though the allusion has in many cases ceased to be intelligible from the old name of the object being forgotten. The charge fixed on was used with great latitude, singly or repeated, or in any way which the bearer chose, or the form of his shield suggested. But as coats of arms became more numerous, confusion often arose from different knights adopting the same symbol; and this confusion was increased by a practice which crept in of sovereigns or feudal chiefs allowing their arms, or part of them, to be borne as a mark of honor by their favorite followers in battle. Hence different coats of arms came in many instances so closely to resemble each other that it was imperative, for distinction's sake, that the fancy of the bearer should be restrained, and regulations laid down regarding the number and position of the charges, and the attitudes of the animals represented. This necessity led, in the course of time, to the systematizing of heraldry, a process which the rolls alluded to show us was going on gradually throughout the 13th and 14th centuries. By the time that heraldry was consolidated into a science, its true origin had been lost sight of, and the credulity and fertility of imagination of the heralds led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating

the adventures or achievements of the founders of the families who bore them. The legends ascribing an origin of this sort to the early armorial bearings have, in nearly all instances where it has been possible to investigate them, turned out to be fabrications. It was only when heraldry began to assume the dignity of a science that augmentations of a commemorative character were granted, one of the earliest known instances being the heart added to the coat of Douglas, in commemoration of the good sir James's pilgrimage with the heart of king Robert. After the science became thoroughly systematized, augmentations and new coats were often granted with a reference to the supposed symbolical meanings of the charges.

In England, the assumption of arms by private persons was first restrained by a proclamation of Henry V., which prohibited every one who had not borne arms at Agincourt to assume them, except in virtue of inheritance or a grant from the crown. To enforce the observance of this rule, heralds' visitations or processions through the counties were instituted, and continued from time to time till the reign of William and Mary. See VISITATIONS, HERALDS'.

Jurisdiction in questions of arms is executed by the heralds' college in England, the lyon court in Scotland, and the college of arms in Ireland. No one within the United Kingdom is entitled to bear arms without a hereditary claim by descent, or a grant from the competent authority; and the wrongful assumption of arms is an act for which the assumer may be subjected to penalties. See HERALDS' COLLEGE and LYON COURT. The use of arms, whether rightfully or wrongfully, subjects the bearer of them to an annual tax. It is illegal to use without authority not only a coat of arms, but even a crest. Any figure or device placed on a heraldic wreath (see WREATH) is considered a crest in questions with the heralds' college or lyon court, as well as in questions with the commissioners of inland revenue. It shows how deeply the passion for outward distinction is implanted in human nature, when we find people in countries such as the United States, where all differences of rank are theoretically repudiated, assuming heraldic devices, each man at his own hand.

Besides individuals, communities and states are entitled to the use of arms, and heralds have classified arms, in respect of the right to bear them, under the following ten heads: 1. Arms of dominion; the arms borne by sovereigns as annexed to their territories. 2. Arms of pretension, which sovereigns have borne, who, though not in possession, claim a right to the territories to which the arms belong. Thus, England bore the arms of France from the time of Edward III. till 1801. 3. Arms of community; the arms of bishops' sees, abbeys, universities, towns, and corporations. 4. Arms of assumption; arms which one has a right to assume with the approbation of the sovereign. Thus, it is said, the arms of a prisoner at war may be borne by his captor, and transmitted by him to his heirs. 5. Arms of patronage; added by governors of provinces, lords of the manor, patrons of benefices, etc., to their family arms, as a token of superiority, right, or jurisdiction. 6. Arms of succession, borne quartered with the family arms by those who inherit fiefs or manors, either by will, entail, or donation. Thus, the dukes of Athole, as having been lords of the Isle of Man, quarter the arms of that island, and the duke of Argyle quarters the arms of the lordship of Lorne. 7. Arms of alliance, taken up by the issue of heiresses, to show their maternal descent. 8. Arms of adoption, borne by a stranger in blood, to fulfill the will of a testator. The last of a family may adopt a stranger to bear his name and arms and possess his estate. Arms of adoption can only be borne with permission of a sovereign or king-at-arms. 9. Arms of concession; augmentations granted by a sovereign of part of his royal arms, as a mark of distinction, a usage which, we have already observed, obtained in the earliest days of heraldry; and hence the prevalence among armorial bearings of the lion, the fleur-de-lis, and the eagle, the bearings of the sovereigns of England and Scotland, of France, and of Germany. 10. Paternal or hereditary arms, transmitted by the first possessor to his descendants.

A coat of arms is composed of charges depicted on an escutcheon representing the old knightly shield. The word escutcheon is derived from the French *écusson*, which signified a shield with armorial bearings, in contradistinction from *écu*, a shield generally. The shields in use in England and France in the 11th and 12th centuries were in shape not unlike a boy's kite, a form which seems to have been borrowed from the Sicilians; but when they became the recipients of armorial bearings, they were gradually flattened and shortened. From the time of Henry III., the escutcheon has been most frequently represented on seals as of something approaching to a triangular form, with the point downwards, the chief exceptions being that the shield of a lady is lozenge-shaped, and of a knight-banneret square. To facilitate description, the surface or field of the escutcheon has been divided into nine points (fig. 1), technically distinguished by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the honor or collar point; E, the fess point; F, the nombril or navel point; G, the dexter base point; H, the middle base; and I, the sinister base point. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation not to the eye of the spectator, but of the supposed bearer of the shield.

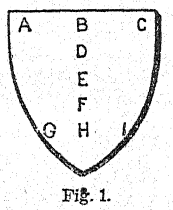


Fig. 1.

Coats of arms are distinguished from one another, not only by the charges or objects borne on them, but by the color of these charges, and of the field on which they are placed. The field may be of one color, or of more than one, divided by a partition line or lines varying in form. The first thing, then, to be mentioned in blazoning a shield —that is, describing it in technical language—is the color, or, as it is heraldically called, *tincture* of the field. Tinctures are either of metal, color strictly so called, or fur. The metals used in heraldry are two—gold, termed *or*, and silver, *argent* —represented in painting by yellow and white. The colors are five—red, blue, black, green, and purple, known as *gules, azure, sable, vert,* and *purpure.* Metals and colors are indicated in uncolored heraldic engravings by points and hatched lines, an invention ascribed to father Silvestro di Petrasancta, an Italian herald of the 17th century. *Or* (fig. 2) is represented by points; for *argent*, the field is left plain. *Gules* is denoted by perpendicular, and *azure*, by horizontal lines; *sable*, by lines perpendicular and horizontal crossing each other; *vert*, by diagonal lines from dexter chief to sinister base; *purpure*, by diagonal lines from sinister chief to dexter base. The *furs* were originally but two, *ermine* and *vair*. The former is represented by black spots resembling those of the fur of the animal called the ermine, on a white ground. *Vair*, said to have been taken from the fur of a squirrel, bluish-gray on the back and white on the belly, is expressed by blue and white shields, or bells in horizontal rows, the bases of the white resting on the bases of the blue. If the vair is of any other colors than white and blue, they must be specified. Various modifications of these furs were afterwards introduced, among others *ermines*, or ermine with the field sable and the spots argent; *erminites*, with a red hair on each side of the black spot; *pean*, with the field sable, and the spots or; *counter-vair*, or vair with the bells of one tincture placed base to base; and *potent counter-potent*, vair with crutch-shaped figures instead of bells.

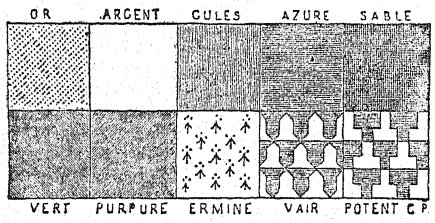
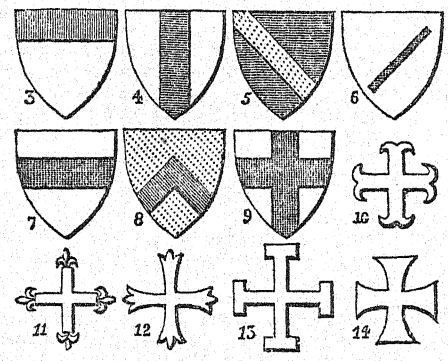


Fig. 2.

It is an established rule of heraldry that metal should not be placed on metal, nor color on color; a rule more rigidly adhered to in English than in foreign heraldry. We have one remarkable transgression of it in the arms of the kingdom of Jerusalem founded by the crusaders, which are argent, a cross potent between four crosses or. A recognized exception exists wherever a charge lies over a field partly of metal and partly of color, or where an animal is (see *infra*) attired, armed, unguled, crowned, or chained with a tincture different from that of his body. Marks of cadency, chiefs, cantons, and bordures are also occasionally exempted from the general rule, being, according to some heralds, not laid on the shield, but *couru*, or sewed to it.

Everything contained in the field of an escutcheon is called a *charge.* Charges are divided by heralds into the three classes of honorable ordinaries, subordinaries, and common charges. Under the name of ordinaries or *honorable ordinaries* are included certain old and very frequent bearings, whose true peculiarity seems to be that, instead of being taken from extraneous objects, they are representations of the wooden or metal strengthenings of the ancient shields. They are ten in number: 1. The *chief* (fig. 3), the upper part of the shield separated from the rest by a horizontal line, and comprising, according to the requirements of heralds, one-third of it, though this proportion is seldom rigidly adhered to. Its diminutive is the fillet, supposed to take up one-fourth the space of a chief, in whose lowest part it stands.



Figs. 3–14.

2. The *pale* (fig. 4) a band or stripe from top to bottom, said, like the chief, to occupy one-third of the shield. It has two diminutives, the *pallet*, one-half in breadth of the pale, and the *indorse*, one-half of the pallet.

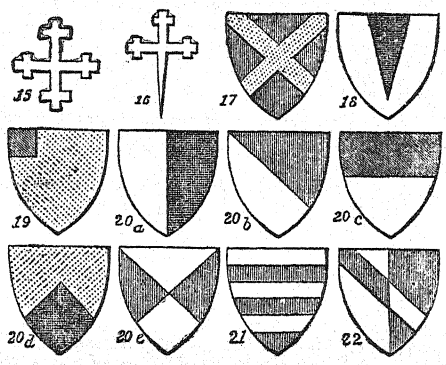
3. The *bend* (fig. 5), a similar band crossing the shield diagonally from dexter chief to sinister base. Its diminutives are the *bendlet* or *garter*, one-half of its breadth; the *cost* or *cotise*, one-half of the bendlet; and the *riband*, one-half of the cotise. The bend is sometimes borne between two cotises, in which case it is said to be *cotised*, a term sometimes applied with doubtful propriety to the other ordinaries when accompanied with their diminutives.

4. The *bend sinister*, a diagonal band from sinister chief to dexter base. Its diminutives are the *scarpe*, one-half of the bend sinister; and the *baton* (fig. 6), one-half of the scarpe. The baton stops short of the extremity of the field at both ends, and has been considered a mark of illegitimacy. See BASTARD BAR.

5. The *fess* (fig. 7), a horizontal band in the middle of the shield, said, like the ordinaries already enumerated, to occupy one-third of it. Its principal diminutive is the *bar*, containing the fifth part of the field; and there are also the *closet*, one-half of the bar, and the *barrulet*, one-half of the closet, the latter seldom borne singly.

6. The *chevron* (fig. 8), composed of two stripes descending from the center of the shield in diagonal directions like the rafters of a roof. Its diminutives are the *chevronel*, of half, and the *couple-close*, one-fourth its width, the latter borne, as its name implies, in pairs, and generally accompanying the chevron—on each side of it.

7. The *cross* (fig. 9), uniting the pale and fess, an ordinary which was originally like the rest, composed of the clamps necessary to the strength of the shield, but had also the deeper meaning of the symbol of the Christian faith. Besides its plain form, the cross was varied in numerous ways, most of these varieties being, however, rather common charges than ordinaries. Of the 39 lesser crosses mentioned by Guillim, and 109 by Edmonson, a few of the most frequently occurring are the following: the *cross moline* (fig. 10), with the ends turned round both ways; the *cross fleury* (fig. 11), of which each limb terminates in a fleur-de-lis; the *cross patonce* (fig. 12), each limb of which has three points; the *cross potent* (fig. 13), crutch-shaped at the ends; the *cross pattée* (fig. 14), small in the center, but widening towards the ends; and the *cross crosslet* (fig. 15), crossed at the ends. The latter is the most frequent of all, and borne oftener in numbers than singly. Any of these crosses is said to be fitchée when the lower limb terminates in a sharp point, as in fig. 16. There is also the *cross Maltese*, whose limbs have each two points, and converge to a point in the center of the cross; though not frequent as a heraldic charge, it derives an importance from being the badge of the knights of Malta and of many other orders.



Figs. 15-22.

8. The *saltire*, or St. Andrew's cross (fig. 17), formed by a junction of the bend dexter and bend sinister.

9. The *pile* (fig. 18), a wedge with the point downwards. A single uncharged pile should, at its upper part, occupy one-third the breadth of the shield, but if charged, it may be double that width.

10. The *quarter*, consisting of the upper right-hand fourth part of the shield cut off by a horizontal and a perpendicular line. Its diminutive is the *canton* (fig. 19).

Armorial figures may be depicted on any of these ordinaries, but not on their diminutives, with the exception of the canton.

We observed that the field of an escutcheon may be of two different tinctures, divided by a partition-line, which line may vary in direction. When divided by a partition-line in the direction of one of the ordinaries, the shield is said to be *party per* that ordinary; thus we may have (figs. 20) a shield party per pale, bend, fess, chevron, or saltire. An escutcheon divided as by a cross is said to be quartered. A shield divided into any number of parts by lines in the direction of a pale, bend, or bar, is said to be *paly, bendy, barry*, the number of pieces being specified, as in the example fig. 21, barry of six, argent and gules. When the field is of a metal and color separated by any of the lines of partition, and the charge placed on it is said to be *counter-changed:* this means that the part of the charge which is on the metal is of the color, and *vice versa*, as in fig. 22, the arms borne by Chaucer the poet, per pale argent and gules, a bend counter-changed.

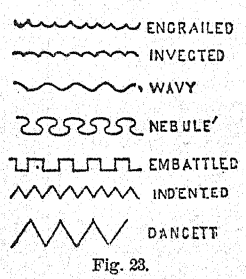


Fig. 23.

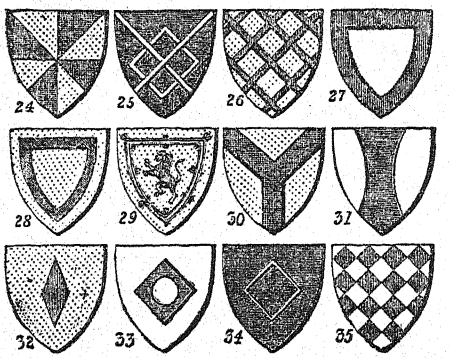
The partition-line which bounds the field, or the boundary-line of an ordinary, is not always even. Fig. 23 represents the commonest forms of irregular partition-lines in use, viz., the *engrailed, invected, wavy, nebulé, embattled, indented*, and *dancetté*. An ordinary engrailed has the points of the engrailed line turned outwards, and an ordinary invected, inwards. Dancetté differs from the indented by the partition-line being marked with only three indentations.

The *subordinaries*, or subordinate ordinaries, are generally enumerated as the following, though there is no very broad line of demarkation between them and the common charges.

1. The *gyron.*—When a shield is at once quartered and party per saltire, as in fig. 24, the division is called *gyronny of eight* (from *gyrus*, a circle), and one of the triangles, or at least the triangle in dexter chief, is a gyron. Gyronny of six, ten, or twelve also occasionally occur, so called according to the number of the triangles.

2. The *fret* (fig. 25) is a cognizance derived from the banding or ornamenting of the shield, and a shield covered with this lattice-work decoration (fig. 26) is said to be *fretty.*

3. The *bordure,* or border (fig. 27), is a stripe encircling the shield. It is much used to distinguish different branches of a family, and is often charged with small devices, on which account it has sometimes been reckoned an honorable ordinary.



Figs. 24—35.

4. The *orle* (fig. 28) differs from a bordure in not touching the extremity of the shield.

5. The *tressure,* regarded as a diminutive of the orle, is generally borne double, and flory counterflory, as in the arms of Scotland, or, a lion rampant within a tressure flory counterflory gules (fig. 29).

6. The *pall* (fig. 30), the archiepiscopal ornament of that name, sent from Rome to metropolitans, and resembling in form the letter Y.

7. The *flanches* (fig. 31), the dexter and sinister sides of the shield cut off by a curved line. Flanches are always borne in pairs, and sometimes charged.

8. The *lozenge,* a figure of four equal sides, with the upper and lower angles acute, and the others obtuse.

9. The *fusil* (fig. 32), longer and more acute than the lozenge.

10. The *rustre* (fig. 33), a lozenge pierced round in the center.

11. The *mascle* (fig. 34), a lozenge perforated, and showing a narrow border. Mascles were probably originally links of chain-armor.

A field is said to be *lozengy* (fig. 35), *fusilly,* or *mascally* when divided by diagonal lines in the direction of these subordinaries. A field divided by horizontal and perpendicular lines into squares of different tinctures is said to be *checky;* in the case of a *fess checky* there are three such rows of squares.

Among subordinaries are sometimes reckoned certain circular charges called *roundels* or *roundlets,* distinguished in English heraldry by different names according to their tinctures. When of or, they are called *bezants;* of argent, *plates;* of gules, *torteaux;* of azure, *hurts;* of purpure, *golpes;* and of sable, *ogresses* or *pellets.*

We now come to the third class of figures occurring in armorial bearings. We have seen that the ordinaries and subordinaries are for the most part purely heraldic figures, connected in their origin with the shield itself; the *common charges,* on the other hand, are representations more or less conventional of familiar objects, which have no necessary relation to the shield; but are in some way emblematic as concerns family or individual history and character. The knights, in the early days of heraldry, ransacked the animal, the vegetable, and the mineral kingdom, as well as the range of things natural and artificial, for cognizances which would be distinctive, and at the same time suggestive, of the name or title of the bearer of them. We can only enumerate a few of the charges of most frequent occurrence.

Of beasts, the *lion* requires special mention. The king of beasts is one of the most frequent of heraldic devices, and is made to assume a great variety of attitudes, for which see Lion. Lions and other beasts of prey are said to be *armed* or *langued* of any tincture when their teeth and claws, or their tongue, is of that tincture. With some change of color or position, the royal beast came to be used by all who could claim kindred, however remote, with royalty, and lions were further multiplied by augmentations granted by the sovereign to favorite followers. The heraldic *leopard,* which has been the subject of much controversy, was originally but another designation for the lion passant-gardant. Bears, boars, bulls, stags, are favorite heraldic beasts. A stag walking is said to be *trippant;* he is *at gaze* when a lion would be statant-gardant; he is *attired* of any tincture when his horns are of that tincture. The animals that possess horns and hoofs are said to be *armed* and *unguled* in respect of them. The heads and limbs of animals are often borne as charges, and they may be either *couped,* cut off in a straight line, or *erased,* cut off with a jagged edge.

Of birds, we have first the *eagle.* The sovereign of birds, and symbol of imperial Jove, was, next to the lion, the most favorite cognizance of royal personages, and was adopted by the German emperors, who claimed to be successors of the Cæsars of Rome. The imperial eagle had at first but one head; the monstrosity of a second head seems to have arisen from a dimidiation of two eagles, to represent the eastern and western empire (see Marshaling of Arms). The eagle of heraldry is most generally *dis-*

played, i.e., its wings are expanded; sometimes it is *preying*, or standing devouring its prey. The *alerion*, the cognizance of the duchy of Lorraine and the family of Montmorency, was originally but a synonym for the eagle assumed (M. Planché suggests) as an anagram for the word Loraine, but modern heralds have degraded it into a nondescript creature without beak or claws. The *martlet* was originally a martin, a species of swallow, which has also in course of time been deprived by heralds of its legs and beak. The pelican, the swan, the cock, the falcon, the raven, the parrot or popinjay, and the peacock, are all of tolerably frequent occurrence. The *pelican* has generally her wings *indorsed*, or placed back to back, and is depicted pecking her breast. When in her nest feeding her young, she is called a pelican *in her piety*. A *peacock* borne affronté with his tail expanded is said to be *in his pride*. Birds of prey are *armed* of the color of which their beak and talons are represented. Such as have no talons are *beaked* and *membered*. The *cock* is said to be *armed*, *crested*, and *jelloped*, the latter term referring to his comb and gills. Birds having the power of flight are, in respect to their attitude, *close*, *rising*, or *volant*.

Fishes and reptiles occur as charges: the former are said to be *naiant*, if drawn in a horizontal, and *hauriant*, if drawn in a perpendicular position; and the *dolphin*, in reality straight, is conventionally borne *embowed* or bent. The *escallop shell* is of frequent occurrence, and said to be the badge of a pilgrim. Sometimes the conventional heraldic form of an animal differs from its true form, as in the case of the *antelope* of heraldry, which has the head of a stag, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck, and similar tufts on the tail, chest, and thighs. Of "animals phantasticall" we have among others the griffin, wyvern, dragon, unicorn, basilisk, harpy. We have the human body in whole or part, a naked man, a savage, or wild man of the woods, also arms, legs, hearts, Moors' heads, Saracens' heads, and that strange heraldic freak, the three legs conjoined, carried in the escutcheon of the Isle of Man.

Of plants, we have *roses*, *trefoils*, *cinquefoils*, *leaves*, *garbs* (i.e., sheaves of corn), *trees*, often *eradicated* or *fructuated* of some other color, and, above all, the celebrated *fleur-de-lis*, used as a badge by Louis VII. of France before heraldry had an existence. When a plant, animal, or other charge is blazoned *proper*, what is meant is that it is of its natural color.

The heavenly bodies, the sun, moon, and stars, are also pressed into the service of heraldry, as are things inanimate and artificial without number, particularly such as were familiar to the warriors and pilgrims of the 12th and 13th centuries. Helmets, buckles, shields, hatches, horseshoes, swords, arrows, battering-rams, pilgrims' staves, mullets (or spur-rowels), and water-bougets, or bags, in which in crusading times water was carried long distances across the desert, also the clarion or war-trump, generally and erroneously called a *rest*. Even the letters of the alphabet have been used as charges.

Charges may be placed either simply on the field or on one of the ordinaries; in some instances, one of the ordinaries is placed over a charge, in which case the charge is said to be *debruised* by the ordinary. Three charges of one kind are placed two above and one below, unless blazoned *in fess* or *in pale*. In the 14th and 15th centuries, the simplicity of early heraldry began to be departed from by accumulating a variety of charges on one shield, and in later times we have sometimes a charge receiving another charge like an ordinary. The growing complexity of shields arose from augmentations granted to distinguish the younger branches of a family, or charges assumed from the maternal coat by the descendants of an heiress. In the end of the last and beginning of the present century, a practice prevailed for a time of introducing into armorial bearings matter-of-fact landscapes, representations of sea-fights, and of medals and decorations worn by the bearer, setting all heraldic conventionalities at defiance, and dealing in details not discernible on the minutest inspection. Such charges are frequent in the arms of the heroes of the old wars; as, for example, in the augmentation granted to sir Alexander Campbell, bart., in addition to his paternal arms—viz., "a chief argent charged with a rock proper, subscribed *Gibraltar*, between two medals; that on the dexter representing the silver medal presented to sir A. Campbell by the supreme government of India, for his services at the storming of Seringapatam, in 1799; that on the sinister representing the gold medal presented to him for his services in the battle of Talavera." The grants proceeding from the present kings-of-arms are more conformable to the usages of heraldry, and do not stand in need of such lengthened explanations to make them intelligible.

The arms of the different members of a family have been distinguished from one another, sometimes by the use of a bordure or other difference; and sometimes, especially by English heralds, by the use of certain figures called *marks of cadency*, the *label*, *crescent*, *mullet*, *martlet*, *annulet*, *fleur-de-lis*, to designate the eldest, second, third, fourth, fifth, or sixth son and his descendants—an invention originating about the time of Henry VII., but which cannot consistently be carried through all the ramifications of a family for a succession of generations. See CADENCY.

Blazonry is an essential part of the science of arms. To blazon a coat is so to describe it that any one with an ordinary knowledge of heraldry will be able to depict it correctly. In the language of blazonry, all tautology must be avoided. The tincture of the

field is first mentioned; the ordinary, if any, follows, unless it be a chief; then the charges between which the ordinary is placed. The charges on the ordinary follow, and lastly we have a canton or chief, and marks of cadency. The rules of blazoning are given in the articles BLAZON, BLAZONRY.

Besides the heraldic devices depicted on the shield, there are the following borne external to it—the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet.

The *helmet*, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and, placed over the arms, it came by its form to mark the rank of the wearer. For these distinctions, which are of comparatively recent date, and applicable only to British heraldry, see HELMET.

The *mantling* is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the *cointoise*, or scarf, wrapped round the body in the days of coat-armor.

From the center of the helmet, within a *wreath* of two pieces of silk of the first two colors of the armorial bearings, issues the *crest*, originally a special mark of honor worn only by heroes of great valor, or advanced to a high military command; now an inseparable adjunct of the coat of arms in English, though not in continental heraldry, and often assumed or changed arbitrarily without proper authority.

The *scroll*, placed over the crest or below the shield, contains a *motto* bearing in many cases an allusion to the family name or arms.

Supporters are figures or animals standing on each side of the escutcheon, and seeming to support it. They were in their origin purely ornamental devices, which only gradually acquired a heraldic character. In England, the right to use supporters is confined to the royal family, peers, peeresses, and peers by courtesy, knights of the garter, knights grand cross of the Bath, and a very few families whose ancestors bore supporters before their general use was restricted. In Scotland, supporters are also used by the baronets of Nova Scotia and the chiefs of various families.

The crown of the sovereign, the miter of the bishop, and the coronet of the nobility are adjuncts appended to the shield of those whose dignity and office entitle them to that distinction. For a description of the crown of Great Britain and the coronets of the royal family, see article CROWN. Under the articles DUKE, MARQUIS, EARL, VISCOUNT, and BARON, the coronets appropriated to the different ranks of the nobility are described.

The subject of *marshaling arms*, or arranging various coats in one escutcheon, is explained in a separate article. Here it may suffice to lay down a few general rules. A husband is entitled to *impale* the arms of his wife, i.e., to place them on the same shield side by side with his own. When the wife is an heiress, the husband bears her arms in an *escutcheon of pretense*, or small escutcheon in the center of his own shield, and the descendants of the heiress may quarter her arms with their paternal coat. A sovereign also quarters the arms of his several states, and feudal arms are sometimes quartered by subjects. An elective king, it is said, may place his hereditary arms on an escutcheon of pretense over the insignia of his dominions.

For information on the details of heraldry, reference is made to the standard works of Guillim, Edmonson, and Nisbet; and for a more discriminating view of the subject, to such recent treatises as Montague's *Heraldry* and Planché's *Pursuivant of Arms*.

HERALD'S COLLEGE, or COLLEGE OF ARMS, a collegiate body, founded by Richard III. in 1483, consisting of the heraldic officers of England, who were assigned a habitation in the parish of All-hallows-the-Less, in London. Various charters confirmed the privileges of the college of arms, and it was reincorporated by Philip and Mary, who bestowed on it Derby house, on whose site in Doctors' Commons the present college was built by sir Christopher Wren.

The presidency of the college is vested in the earl-marshal, an office now hereditary in the family of Howard duke of Norfolk; he nominates the three kings-of-arms, six heralds, and four pursuivants, who are the members of the collegiate chapter. Persons having a hereditary claim to arms, which has been disused for one or more generations, are empowered by the heralds' college to resume them, on proof and registration of pedigree. A person who has no hereditary claim, and wishes a grant of arms, must memorialize the earl-marshal, and show that he is in a condition to "sustain the rank of gentry." An important department of the heralds' college is the recording of pedigrees. Any pedigree showing the existing state or descent of a family may, if accompanied with sufficient evidence, be entered on the books of the college. The members of the college have salaries, but derive their principal income from fees charged for assistance in tracing pedigrees and titles, and for the granting and registration of arms. In Scotland, the corresponding functions belong to the LYON COURT (q.v.).

HERAT', capital of the most westerly of the three divisions of Afghanistan, stands on the river Heri, at the height of 2,500 ft. above the sea. Lat. 34° 50′ n., long. 62° 30′ e.; distance from Cabul, 390 m. west. Situated near the boundaries at once of Afghanistan, Persia, and Independent Tartary, Herat is one of the principal marts of central Asia, carrying on at the same time extensive manufactures of its own in wool and leather. The vicinity, naturally fertile, has been artificially rendered much more so by means of irrigation. But the city claims notice mainly on political and military grounds.

Long the royal seat of the descendants of Timur, and often a bone of contention between the warlike tribes all round, it is fortified by a ditch and wall, and is commanded on its n. side by a strong citadel. In more modern times, the place has acquired a kind of European importance, being, towards Persia, the key of Afghanistan, which, again, in turn affords the only approach by land to western India. In this connection, Herat has been viewed as an outpost of England's eastern empire against Russian intrigue and encroachment. Hence it has been alike the subject of treaties and the occasion of wars between Great Britain, as the mistress of Hindustan, and Persia, as virtually a vassal of Russia. This feature of the history of the city was more specially developed in connection with the last conflict between Persia and England. In Nov., 1856, the shah, regarded by the British government as the vassal and agent of the czar, captured Herat, while actually conducting negotiations for an amicable adjustment at Constantinople; but he was within a few months constrained to relinquish his prey and renounce his claims by a British expedition directed against the opposite extremity of his empire. According to different estimates, referring, however, to different epochs, the population has varied from 20,000 to 70,000.

HÉRAULT, a maritime department in the s. of France, bounded on the s.e. by the gulf of Lyon, is oval in form, and is 84 m. in greatest length from e. to west. Area, 2,436 sq. m.; pop. '76, 445,053. It is occupied in the n. and n.w. by the Lower Cévennes, from which several branches of moderate elevation run toward the s., gradually subsiding as they approach the sea. The principal rivers are the Hérault (from which the department derives its name), the Orb, and the Lez, which, rising in the Cévennes, pursue a generally southward course to the Mediterranean. The coast-line is about 66 m. in length; and along the shore, from Agde to the Vidourle, are numerous *étangs*, or marshy lakes, united by the Canal-des-étangs, and communicating with the sea. In the neighborhood of the *étangs* the climate is unhealthy, especially in summer, when agues and fevers prevail; but elsewhere throughout the department it is unusually fine. About a fourth of the entire area consists of arable land, and about a sixth is under vineyards. The department of Hérault stands, for quantity at least, at the head of the wine-growing departments of France, 46,552,000 gallons being the average annual produce. From the shore-lakes and the sea immense quantities of fish are obtained. Woolen, silk, and cotton fabrics, in great variety, are largely manufactured. Coal and copper mines, as well as quarries yielding variously veined marbles, building-stone, granite, etc., are worked. This department supplies a great quantity of the salt used in France. It is divided into four *arrondissements*. Montpellier is the capital.

HERBA'RIUM, the name usually given to a collection of dried plants, intended for the future study and examination of botanists. For collecting plants, a box of tinned iron, called a *vasculum*, is generally used, which preserves most plants from withering for at least some hours. Plants intended for the herbarium should be collected on a dry day; plants which when gathered have moisture on their leaves should, when brought home, be placed in a vessel of water, and there allowed to dry. Plants with thick succulent stems or leaves are immersed for a few seconds in hot water to kill them. The specimens are then laid between layers of blotting-paper, or of a thick bibulous kind of paper called botanical drying-paper, not spread out with anxious minuteness, nor so placed as to distort their parts. The number of sheets of paper in each layer is accommodated to the nature of the plants, and pressure is applied by means of weights, screws, or straps, the whole being inclosed in boards, and the layers of paper, when very numerous, having also boards occasionally interposed. Care must be taken that too much pressure be not applied at first, lest the parts of the plants be unfitted for future examination. For a short time, the paper is changed every day, or every second day, dry paper being supplied. Specimens have the best appearance which are quickly dried. Some plants which, in spite of all care, lose their natural colors in the ordinary method of drying, and become black, as orchids, may be beautifully dried by inclosing the layers of paper in a network wire-frame, and hanging the package before a fire, where it is turned round like meat roasting. Specimens are thus dried in a few hours, which otherwise would have required eight or ten days.—When the specimens are fully dried, they are laid within sheets of writing-paper, or they are gummed or glued to sheets of paper, the name of the species, with the locality, date of collection, and any other interesting particulars, being marked beside each. As much as possible of each plant is preserved in the herbarium, but the flower and leaf must always be exhibited. Some parts of plants, as succulent roots, fruits, etc., are otherwise preserved. The herbarium is arranged according to a botanical system. Care must be taken to preserve it from the ravages of moths and beetles by frequent inspection, by the aid of camphor, and by the occasional application of a little corrosive sublimate. There are herbaria in existence which are now some centuries old, and which are still consulted for the identification of species. The herbarium enables us to compare plants which flower at different seasons, and those of different countries. The herbaria formed by travelers have been of great importance to the progress of botany.

HERBART, JOHANN FRIEDRICH, a German philosopher, was b. at Oldenburg, May 4, 1776. He was educated at Jena. At a very early age, he was familiar with religious and metaphysical doctrines and discussions, and at twelve years had read the systems of

Wolff and Kant. He became the pupil of Fichte, and received his philosophy with enthusiasm; but after more reflection, he found himself obliged to reject much of his system, and to form one of his own. In 1805 he was appointed extraordinary professor of Göttingen; in 1809 he obtained the chair of philosophy at Königsberg. In 1833 he returned to Göttingen, where he remained till his death, Aug. 14, 1841. His collected works were published by his scholar Hartenstein (12 vols., Leip. 1850–52).

The starting-point of Herbart's metaphysics is the thesis that the ordinary (metaphysical or popular) conceptions of a thing with attributes, change, matter, and self-consciousness contain in themselves contradiction. The multiplicity and variety of the world of phenomena cannot be explained on the hypothesis of only one real (substance); a multiplicity of reals (monads) must be assumed, and out of their mutual relations time, space, nature, and thought arise. In ethics, Herbart rejects Kant's autonomy of the pure reason as basis, and founds on developed and cultured feeling or common-sense—in this resembling Shaftesbury. The five practical ideas are freedom, perfection, benevolence, justice, and fairness. In psychology, Herbart endeavored, by regarding ideas or states of mind as so many physical forces, to understand their relations to one another at any given time by help of a most elaborately wrought-out mathematical calculus. The *Pædagogic* of Herbart is admirably practical. In opposition to contemporary idealism, Herbart called his system realism. On the fall of Hegelianism in Germany, Herbart's system became very influential, and has still numerous adherents in the German universities.

HERBELOT, BARTHÉLEMY D', a celebrated orientalist, was b. in Paris, Dec. 4, 1625, and finally became professor of Syriac in the college of France. He died at Paris, Dec. 8, 1695. His celebrated work, the *Bibliothéque Orientale,* was published after his death by Galland (Paris, 1697), and afterwards with a supplement (Maestricht, 1776–81); but the best edition is that published at the Hague (1777–82, 4 vols.). It is unfortunate that Herbelot was unable to give the finishing touch to a work which had cost him so much labor and research, and which, in spite of the errors, repetitions, contradictions, and omissions which one meets with, still bears a deservedly high character. It contains extracts from a multitude of Arabian, Persian, and Turkish authors.

HERBERT. This name, which stands forth prominently upon the records of British history, has been ennobled at various times, in so many of its branches, by so many ancient and renewed creations, that it has become a matter of difficulty to ascertain with certainty which is the parent stem; though sir Bernard Burke is inclined to give the representation of the house to Henry Arthur Herbert, M.P., of Muckross, co. Kerry. It is certain that the Herberts came over to England in the train of William the conqueror, for Herbert, count of Vermandois, who afterwards filled the post of chamberlain under William II., is mentioned in the roll of Battle abbey, and received from his sovereign a grant of lands in Hampshire. His wife Emma, daughter of Stephen, count of Blois, was a granddaughter of the conqueror, and his son Herbert (called in history Herbert of Winchester) was chamberlain and treasurer to king Henry I. Seven or eight generations later, we find the Herberts diverging into several distinct branches, including the lines of the earls of Powis (now extinct in the male line), of the lords Herbert of Cherbury (also extinct), the Herberts of Muckross (ancestors of the gentleman mentioned above), and also several untitled branches which have flourished upon their ancestral lands in England, Wales, and Ireland. In the reign of Henry V., sir William Herbert, of Raglan castle, co. Monmouth, received the honor of knighthood in reward of his valor in the French wars. His eldest son, a stanch adherent of the house of York, was created earl of Pembroke* by Edward IV. in 1469, but fell into the hands of the Lancastrians after the battle of Danes moor, and was beheaded the following day, when the title became extinct. It was, however, revived in 1551, in the person of his (illegitimate) grandson, William Herbert, K.G., one of the most influential noblemen of his age, and one who took an active part in public affairs, both as a statesman and as a soldier. It is recorded by sir B. Burke that "he rode on Feb. 17, 1552–53, to his mansion of Baynard's castle, with 300 horse in his retinue, 100 of them being gentlemen in plain blue cloth, with chains of gold, and badges of a dragon on their sleeves." He was buried in old St. Paul's, and his funeral was conducted on such a scale of magnificence that, according to Stowe, the mourning given away on that occasion cost £2,000—a very large sum in those days. By his wife, who was a sister of Catharine Parr (the last queen of Henry VIII.), he had a son Henry, second earl, K.G., to whose countess, Mary, daughter of sir Henry Sydney, K.G., sir Philip Sydney dedicated his *Arcadia.* She is celebrated by Ben Jonson in the well-known lines—

> Underneath this marble hearse
> Lies the subject of all verse—
> Sydney's sister, Pembroke's mother.

The fourth earl, some time lord chamberlain to Charles I., and chancellor of the university of Oxford, was the founder of Jesus college in that seat of learning. The eighth earl held several high offices under queen Anne, including that of lord high admiral.

*The earldom of Pembroke was originally conferred on Richard de Clare, the celebrated Strongbow, who aided Henry II. in the conquest of Ireland.

From him the present earl of Pembroke (George Robert Charles Herbert, born in 1850) is directly descended. The late lord Herbert (q.v.) of Lea—better known as Mr Sidney Herbert—was the younger brother of the late, and father of the present, earl. The earls of Carnarvon, more than one of whom have gained celebrity in the field of literature, descend from the eighth earl of Pembroke mentioned above. The present earls of Powis are descended from the same stock maternally, the only child and heiress of the last earl of Powis of a previous creation having married the eldest son of the illustrious Robert Clive, the founder of our Indian empire, in whose favor that title was renewed in 1804.

HERBERT, EDWARD, Baron Herbert of Cherbury, who is commonly reckoned the first of the English deistical writers, was b. of a noble family in the year 1581, at Montgomery castle, in north Wales. In his autobiography, he has described his early love for inquiry and his scrupulous truthfulness. He was sent to Oxford in his twelfth year, and before he had quite quitted his studies he married an heiress. On the occasion of the coronation of James I., he was made a knight, and invested with various offices. Although his marriage was happy enough, there appears to have been little warmth of affection between him and his wife, who was considerably older than himself. He left home, accordingly, for travel in France in 1608, and from this time resided very much abroad. In Paris, he lived on terms of intimacy with the constable Montmorency, Jean Casaubon, and other distinguished men. After a brief return to his native country, he set out again in 1610 for the low countries, where he joined the arms of the brave Maurice of Orange. For this prince he contracted a great affection, and again offered him his services in 1614. After a campaign, he traveled through Germany and Italy on horseback, and went as far as Venice, Florence, and Rome. On his return, he got into trouble from an attempt which he made to raise a troop of Protestant soldiers in Languedoc for the duke of Savoy. Shortly after, he returned to England, and proposed to devote himself to study and philosophical inquiry; but high and important diplomatic duties awaited him. He was made a member of the privy council, and sent to France as extraordinary ambassador. His aim was to promote the alliance between France and England, and he was so far successful that he was appointed ordinary ambassador, and continued to reside at Paris. He tried, but without much success, the difficult task of negotiation between Louis XIII. and his Protestant subjects. He was elevated first to be a peer of Ireland, and then in 1630, five years after the accession of Charles I., to be a peer of England, with the title of Baron Herbert of Cherbury. When the civil war broke out, he appears to have acted with hesitation, at first siding with the parliament and then joining the king. His hereditary seat, Montgomery castle, was attacked and burned. He died in London in the year 1648.

The character of Herbert, as depicted in his autobiography, is in the main that of a gallant adventurer, equally fired with the love of arms and of arts, at once a soldier and a scholar. He is the gay man of the world, always truthful, honorable, and high-spirited; yet he has thoughts above those of the world; he ponders deeply the great questions of truth and religion, and has left us the result of his speculations in his two treatises, *De Veritate* and *De Religione Gentilium*. The reader will find an admirable analysis of the first and more important of these treatises in Hallam's Literary History. They are only interesting to the philosophical student, or to the inquirer into the history of religious opinion in England. Herbert's position at the fountain-head of English deism gives them a peculiar significance. He is far, however, from being *skeptical*, in the modern sense of the term. His speculations are those of a philosophical dogmatist rather than of a critical inquirer. His arguments are abstract and deductive, and not analytical or negative. He offers solutions rather than starts difficulties or obtrudes negations; and in this respect Herbert is rightly reckoned the first of English deists, the writings of all of whom partake more or less of the same character; although it is not easy to trace any links of direct connection between him and the outburst of deistical literature in the end of the 17th and beginning of the 18th century.

HERBERT, GEORGE, an English poet, and fifth brother of lord Herbert of Cherbury (q.v.), was b. in Montgomery castle, Wales, on April 3, 1593. He was educated at Westminster, and was sent to Trinity college, Cambridge, about 1608. In 1615 he was elected fellow; and in 1619 he was promoted to the office of public orator. At the university he made the acquaintance of lord Bacon; and in the hope of preferment, he was induced to spend a considerable portion of his time about the court. On the death of James I., he studied divinity, and finally took holy orders. He was made prebendary of Leighton Bromswold in 1626. He married in 1630; and in the same year, received the rectory of Bemerton. Two years after, at the early age of 39, he died of the effects of a quotidian ague. His principal poetical production, printed in 1633, a year after his death, is entitled *The Temple, or Sacred Poems and Private Ejaculations*, and, although disfigured by fantastic conceits, contains several passages of the purest pious verse which the language possesses. He wrote a prose work, *The Country Parson*, which lays down rules for the guidance of a clergyman's life, and which may be considered a pendant to *The Temple*. His life was written by Izaak Walton, and to that

quaint and loving pen, even more than to his own *Temple* songs, he owes his immortality.

HERBERT, HENRY WILLIAM, 1807–58; b. London; the son of the dean of Manchester; graduated at Cambridge; emigrated to New York in 1831, and for eight years taught Greek in a private school. He was for three years (1833–36) editor of the *American Monthly Magazine*. In 1834 he began to publish works of fiction, of which seven or more appeared within 20 years. He wrote also a number of historical works; but his forte was as a writer on field-sports, on which subject, under the name of "Frank Forrester," he was without a rival. His works were very popular and are still in high repute. He was also an industrious editor, and a constant writer for magazines and newspapers.

HERBERT, JOHN ROGERS, b. England, 1810; studied in the royal academy and became a portrait and general painter. He was employed on the decoration of the houses of parliament, where he painted several frescos illustrating justice and its development in law and judgment. He is a member of the royal academy.

HERBERT, LORD, OF LEA (SIDNEY HERBERT), minister and statesman, son of the eleventh earl of Pembroke by his second wife, was b. at Richmond in 1810. Educated at Harrow and at Oriel college, Oxford, he devoted himself to public life, and entered the house of commons in 1832 as member for South Wilts, which he represented until his elevation to the peerage in 1861. He began his political career as a conservative, and was secretary to the admiralty in sir R. Peel's administration from 1841 to 1845, when he became secretary-at-war. As a member of this administration, it fell to him to oppose Mr. Cobden's motion for a select committee to inquire into the effect of the corn-laws on farmers, and, afterwards, to argue in support of free trade in corn. He went out of office with his party in 1846. In 1852 he was again secretary-at-war, under the Aberdeen ministry, and, in consequence, the "horrible and heart-rending sufferings" of the army before Sebastopol were laid in a great degree at his door. He was for a few weeks colonial secretary in the first administration of lord Palmerston in 1855, and secretary-at-war in his second administration in 1859. Great improvements in the sanitary condition and education of the army, the amalgamation of the Indian with the royal army, and the organization of the volunteer force, signalized his army administration. He largely reformed the war-office, and was devoting himself with equal zeal and intelligence to his ministerial duties, when, owing to failing health, he resigned his seat in the house of commons, and in 1861 was called to the upper house, under the title of Baron Herbert of Lea. But release from labor came too late, for he died Aug. 2, 1861. He was heir-presumptive to the twelfth earl of Pembroke. He had great aptitude for business, winning and genial manners, great readiness and fluency in debate, and a boundless philanthropy. He was a liberal patron of the arts; and his Lombardian church at Wilton, near his splendid abbey-seat in Wiltshire, will remain a lasting monument of his taste and munificence. He married, in 1846, the daughter of maj.gen. A'Court, niece of the first lord Heytesbury; and his eldest son, born in 1850, is now earl of Pembroke and Montgomery.

HERBERT, Sir THOMAS, 1606–82; an English traveler and author. He was in the suite of sir Dodmore Cotton, who was about to leave as ambassador for Persia in company with sir Robert Shirley. Sailing in March, 1627, they visited the cape, Madagascar, Goa, and Surat; having landed at Gombroon, they traveled inland to Asharoff, and thence to Cazbeen, where both the chiefs of the expedition died. Herbert reached England again in 1629, and in 1630, to his great disappointment, his patron the earl of Pembroke died suddenly. After this he traveled on the continent for more than a year. From his return in 1631 till about two years after his marriage in 1632 he retained his ambition for court favor, but failing in this he retired, probably to his estate of Tintern in Monmouthshire, till the outbreak of the civil war, when he sided with the parliament. In 1646 he was appointed to attend the king with his other servants. Becoming a devoted royalist, he continued with his majesty during the last two eventful years of his life, and at the restoration he was rewarded with the title of baronet. He resided at Westminster till the great plague, when he returned to York and bought Petergate house, where he died.

HERBIVORA, Lat. *plant-eaters*, an order of ungulate or hoofed mammals, which feed wholly upon vegetable food, using their limbs for support and locomotion only. The animals in this order have been differently classified by different naturalists. Cuvier divided them into two orders, the *pachydermata* and *ruminantia*. The pachydermata comprises the thick-skinned herb-eaters, as the elephant, rhinoceros, tapir, hog, hippopotamus, horse, and others. In the ruminantia, or cud-chewers, he placed the deer, the antelope, the sheep, the ox, and like animals. If Cuvier's orders are placed in one, then the herbivora will contain the suborders *proboscidians* (elephants), *tapiridians*, having long noses, but not prehensile or only very slightly so, as in the rhinoceros and tapir; the *suidians*, having long but not at all prehensile snouts, as the hog and the hippopotamus; the *solipedes*, or those having one toe only to each foot, and the *ruminants*, or the cud-chewers, having cloven hoofs. Agassiz, in his classification, placed the herbiv-

ora with the marsupials and carnivora as the three orders of the eighth class. This classification is not generally followed.

HERBS, or HERBA'CEOUS PLANTS, in botany, are those in which no persistent woody stem is formed above ground. In some, the stem is woody, but still annual. There is, however, in many a permanent woody *rhizome*, or root-stock.—In books of gardening, plants used only for flavoring are sometimes distinguished as *sweet herbs*, as mint, basil, etc.; whilst those valued for their nutritive qualities are known as *pot-herbs*.

HERCULA'NEUM, an ancient city of Italy, was situated at the north-western base of Mt. Vesuvius, about 5 m. e. of Naples. Considerable obscurity envelops its early history; it is supposed, however, to have been of Phenician origin, and to have been occupied afterwards by Pelasgians and Oscans. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later it fell into the hands of the Romans. In 63 A.D. the city was seriously injured by a violent earthquake; and in 79 it was buried, along with Pompeii and Stabiæ, by the memorable eruption of Vesuvius (q.v.) which took place in that year. It now lies at a depth of from 70 to 120 ft. below the surface, and is filled up and covered with volcanic tufa, composed of sand and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic eruptions. Above it, on the modern surface, are the two large villages Portici and Resina. In the latter, in 1706, on the occasion of deepening a well, fragments of mosaics were first brought up; but little was done in the way of systematic excavation till 1738, when explorations were commenced under royal authority. It was then discovered that the building near the bottom of the well, from which the first relics were obtained, was the theater. This building was forthwith explored and cleared, and several statues, both in bronze and marble, were extracted from it. Excavations were carried on but to a limited extent, not only in consequence of the hardness of the tufa, but from the fear of undermining the dwellings on the surface. Hence visitors can see only a very small portion of this entombed city. The chief edifice shown is the theater, which had been very large, and was built but a short time before the fatal eruption. It has 18 rows of stone seats, and could accommodate 8,000 persons. A basilica, two small temples, and a villa have also been discovered; and from these buildings many beautiful statues and remarkable paintings have been obtained. Among the art-relics of Herculaneum, which far exceed in value and interest those found at Pompeii, may be mentioned the statues of Æschines, Agrippina, the Sleeping Faun, the Six Actresses, Mercury, the group of the Satyr and the Goat, the busts of Plato, Scipio Africanus, Augustus, Seneca, Demosthenes, etc. These treasures, together with such vases and domestic implements as have been found, have been conveyed to the museum at Naples. Latterly, the portion of Herculaneum towards the sea, which had been covered only by loose ashes, has been laid open, and ancient buildings may now be seen there to advantage as well as at Pompeii.

HERCULES (Gr. *Herakles*), called likewise *Alcides*, after his grandfather Alcæus, was the son of Zeus and Alcmene, and the most celebrated hero of the Greek legends, the ideal of human perfection, as conceived in the heroic ages; i.e., the greatest physical strength, connected with every high quality of mind and character which these ages recognized. He had a bitter enemy in Hera, who, knowing that the child who should be born that day was fated to rule over all the descendants of Perseus, contrived to prolong the travail of Alcmene, who was the daughter of Alcæus, son of Perseus, and hasten that of the wife of Sthenelus, another son of Perseus, who, after a pregnancy of seven months, gave birth to a son, named Eurystheus. Eurystheus thus, by decree of Fate, became chief of the Perseidæ. Pindar and other subsequent writers relate that, while yet in his cradle, Hercules showed his divine origin by strangling two serpents sent by Hera to destroy him. By Amphitryon's care, he was instructed in all arts by the first masters. Amphitryon now sent him into the country, where he tended the flocks till he was 18 years of age. During this period, as the sophist Prodikos relates in his poem, Hercules, meeting the goddesses of Pleasure and Virtue at the crossways, chose the latter to be the constant companion of his life.

His first exploit was the slaying of a lion which haunted Mt. Cithæron and ravaged the dominions of king Thespios. Hercules was kindly received by the king, and at length succeeded in destroying the lion. On his return to his native city of Thebes, he not only freed it from the disgrace of having to pay tribute to the Orchomenians, but compelled them to pay double the tribute which they had formerly received. In return for this service, Creon, king of Thebes, gave him his daughter Megara in marriage. At this time, Eurystheus summoned Hercules to appear before him, and ordered him to perform the labors which, by priority of birth, he was empowered to impose upon him. Hercules, unwilling to obey, went to Delphi to consult the oracle, and was told that he must perform ten labors imposed by Eurystheus, after which he should attain to immortality. This reply plunged Hercules into the deepest melancholy, which Hera increased to madness, so that he killed his own children by Megara. When he recovered his senses, he returned, submitted to Eurystheus, and addressed himself to the performance of the labors imposed upon him.—The first labor was to destroy the lion which haunted the forests of Nemea and Cleonæ, and could not be wounded by the arrows of a mortal. Hercules boldly attacked him with his club, but in vain; and he was finally obliged to

strangle him with his hands. From this time, he wore the lion's skin as armor.—The second was to destroy the Lernæan hydra, which he accomplished with the assistance of his friend Iolaus; but because Hercules obtained assistance in this labor, Eurystheus refused to count it.—His third was to catch the hind of Diana, famous for its swiftness, its golden horns, and brazen feet.—The fourth was to bring alive to Eurystheus a wild boar which ravaged the neighborhood of Erymanthus.—The fifth was to cleanse the stables of Augeas, king of Elis, where 3,000 oxen had been confined for many years, which he accomplished in one day, by turning the rivers Alpheus and Peneus through the stables. But as Hercules had gone to Augeas, and offered to perform this service on payment of a tenth of the cattle, and concealed the fact that he had been commanded to perform it by Eurystheus, the latter, hearing of this, judged that it must not be counted as one of the labors.—His sixth was to destroy the carnivorous birds, with brazen wings, beaks, and claws, which ravaged the country near the lake Stymphalis, in Arcadia.—The seventh was to bring alive to Peloponnesus a bull, remarkable for his beauty and strength, which Poseidon, at the prayer of Minos, had given to Minos, king of Crete, in order that he might sacrifice it, which Minos afterwards refusing to do, Poseidon made the bull mad, and it laid waste the island. Hercules brought the bull on his shoulders to Eurystheus, who set it at liberty. It appears again as the Marathonian bull in the story of Theseus.—The eighth labor was to obtain the mares of Diomedes, king of the Bistones in Thrace, which fed upon human flesh.—The ninth was to bring the girdle of Hippolyta, queen of the Amazons.—The tenth labor was to kill the monster Geryon, and bring his herds to Argos. These were all the labors which were originally imposed on Hercules, but as Eurystheus declared the second and fifth unlawfully performed Hercules was ordered to perform two more.—The eleventh was to obtain the golden apples from the garden of the Hesperides. Atlas, who knew where to find the apples, brought them to Hercules, who meanwhile supported the vault of heaven; but according to others, Hercules went himself and stole the apples, after slaying the dragon who guarded them.—The last and most dangerous labor was to bring from the infernal regions the three-headed dog Cerberus. Pluto promised him Cerberus on condition that he should not employ arms, but only force. When Hercules had brought the monster to Eurystheus, the latter, pale with fright, commanded him to be removed. Hercules set him at liberty, whereupon Cerberus immediately sank into the earth. Hercules was now free from his state of servitude.

To these well-known "twelve labors" must be added many other achievements, such as his battles with the centaurs and with the giants; his participation in the expedition of the Argonauts; the liberation of Prometheus and Theseus, etc. After accomplishing all these exploits, Hercules, while in a state of mental aberration, murdered his faithful friend Iphitus; he was afterwards purified from the murder; but was compelled to sell himself for three years into slavery. When his period of slavery had expired, he returned to Peloponnesus, and some time afterwards became a suitor for the hand of Dejanira, the daughter of Œneus, king of Calydon, whom he married, after having overcome his rival Achelous. With her he now repaired to Trachinia. Having arrived at the river Evenus, he encountered the centaur Nessus. Hercules passed through on foot; but Nessus, under pretense of carrying Dejanira over, attempted to offer her violence; whereupon Hercules slew him with an arrow dipped in the poison of the Lernæan hydra. Nessus, before expiring, instructed Dejanira how to prepare a love-potion for Hercules. The hero now made war against Eurytos (king of Œchalia, who had defrauded him), slew him and his sons, and carried off his daughter Iole. Thence he went to Kenæon in Eubœa, and erected an altar to Zeus Kenæos. In order to celebrate the rite with due solemnity, he sent Lichas to Trachis for a white garment. Dejanira, being jealous of Iole, anointed the robe with the philter she had received from Nessus. Hercules put it on, and immediately the poison penetrated his bones. Maddened by the terrible pain, he seized Lichas by the feet and flung him into the sea. He tore off the dress, but it stuck to his flesh, which was thus torn from his bones. In this condition Hercules was conveyed by sea to Trachinia; and Dejanira, being informed of what had occurred, destroyed herself. Hercules himself repaired to Mt. Œta, where he erected a funeral-pile, and ascending it, commanded that it should be set on fire. The burning pile was suddenly surrounded by a dark cloud, in which, amid thunder and lightning, Hercules was carried up to heaven. There he became reconciled to Hera, and married Hebe.

According to most mythologists, there were several heroes of the name of Hercules. Among these are an Indian, an Egyptian, a Tyrian or Phenician, and a Theban Hercules. The last is the most celebrated, and to him the actions of the others have possibly been attributed. Others, who would explain the story of Hercules symbolically, pretend that it conceals an astronomical idea; while others discover in this myth the history of the early development of Greece. On the astronomical hypothesis, the twelve labors of Hercules are simply the course of the sun through the twelve signs of the zodiac, which the plastic poetry of the Greeks has converted into a legend. According to Max Müller, Hercules was the sun-god, and the legend of his death symbolizes the sunset: "In his last journey Hercules proceeds from east to west. He proceeds from the Kenæon promontory to Trachis, and then to Mount Œta, where his pile is raised. The coat which Dejanira sends to the solar hero is an expression frequently used in

other mythologies, it is . . . . the clouds which rise from the waters and surround the sun like a dark raiment. Hercules tries to tear it off, i.e., his fierce splendor breaks through the thickening gloom, but fiery mists embrace him, and are mingled with the parting rays of the sun, and the dying hero is seen through the scattered clouds of the sky tearing his own body to pieces, till at last it is consumed in a general conflagration." Comparative Mythology, in the *Oxford Essays*, 1856.

Festivals were celebrated in honor of Hercules, at which his exploits were sung. In this manner arose the *Heracleia*, long poems celebrating the life and actions of Hercules. Hercules is represented in plastic art as the ideal of a hero. Strength is the characteristic idea, which has been developed by the sculptors Myron and Lysippus in a form not to be surpassed. A complete series of representations of the twelve labors may be seen in the vases of Volce. The conflict with the giants very frequently occurs on vases of the oldest style; the one on the casket of Cypselos is particularly worthy of notice. Hercules's figure is generally youthful.

HERCULES, PILLARS OF, the name given by the ancients to the two rocks forming the entrance to the Mediterranean at the strait of Gibraltar. Their erection was ascribed by the Greeks to Hercules, on the occasion of his journey to the kingdom of Geryon. According to one version of the story, they had once been united, but Hercules tore them asunder, to admit the flow of the ocean into the Mediterranean; another version represents him as causing them to unite temporarily, in order to form a bridge. The pillars are not mentioned in Homer, though he speaks of Ulysses's passage out of the Mediterranean into the ocean and back, showing an apparent knowledge of the existence of the strait. The first author who mentions them is Pindar, who places them at Gades (Cadiz), and his opinion had many followers in later times. The most general opinion, however, identified them with Calpe (now Gibraltar) and Abyla (now Ceuta).

HERCULES BEETLE, *scarabæus Hercules*, or *dynastes Hercules*, a coleopterous insect of the family *lamellicornes* and tribe *scarabæides*, remarkable not only for its great size—it being 5 in. long—but for the singular appearance of the male; an enormous horn projecting from the head, and being opposed by a similar but smaller projection of the thorax, the whole resembling a pair of great but somewhat unequal pincers, of which the body of the insect is the handle. It is a native of Brazil.

HERCYN'IAN FOREST (Lat. *hercynia silva;* Gr. *herkynia hylē*, or *herkynion oros*), the general designation of the entire wooded mountain-range of middle Germany, from the Rhine to the Carpathian mountains. Different ancient writers, however, apply the name sometimes to one part, sometimes to another of the range. Aristotle makes the Ister (or Danube) take its rise in it. Cæsar, who estimates it at 9 days' journey in breadth, and 60 in length, comprehends under this name the whole of the mountain-ranges in Germany n. of the Danube; while some identify it with the Bohemian forest, and others with the Thuringian forest. Modern geographers apply the term, for the most part, in a very arbitrary manner.

HERDER, JOHANN GOTTFRIED VON, an illustrious German thinker, was b. at Morungen, in e. Prussia, in 1744, and studied philosophy at Königsberg under Kant, for whom he conceived an enthusiastic admiration, although subsequently he became one of his most resolute opponents. Here, also, he made the acquaintance of Hamann (q.v.), who first introduced him to the oriental languages and literatures, and made him appreciate the poetic beauty of the primitive civilizations. In 1764 he was appointed assistant professor and preacher at the cathedral school of Riga, where his sermons were greatly admired. Here he published his first works, *Fragmente über die neuere Deutsche Literatur* (Fragments on the Recent German Literature, 1767), in which, with bold and fiery vehemence, he attacked the wretched puerilities and errors of the national literature of the day, and the *Kritische Wälder* (lit., Critical Forests, 1769), once, but no longer, of great theological importance. These two works contain the germs of all that is essentially peculiar and characteristic in Herder's thinking. It was during a temporary residence at Strasburg that Goethe made his acquaintance. The latter was five years younger than Herder, and, as yet, nameless in literature; while Herder, by his *Fragments*, was kindling with new fire the soul of Germany. Goethe almost worshiped him; he tells us (in his autobiography) that the very handwriting of Herder exercised "a magical influence" (*eine magische gewalt*) over him. In 1775, on the recommendation of Goethe, he was invited to Weimar by the grand-duke, and appointed court-preacher and consistorial councilor. Here he resided until his death, which took place Dec. 18, 1803. Herder's writings are very numerous, amounting in all to 60 vols. (Stuttg. 1827–30). They may be divided into three classes: 1. Those relating to religion and theology; 2. Those relating to literature and art; 3. Those relating to philosophy and history. As a theologian his most important work is his *Geist der Hebr. Poesie* (Spirit of Hebrew Poetry, Dess. 1782; later edition, Leip. 1825; translated into English by Dr. James Marsh, 2 vols. Burlington, 1833). As a philosopher he has left behind him a fund of valuable observations on nature and mankind. His philosophical master-piece is his unfinished *Ideen zur Philosophie der Geschichte der Menschheit* (Ideas towards a Philosophy of the History of Mankind, 4 vols. Riga, 1784–91; 4th edition, with Luden's Introduction, 2 vols. Leip. 1841; translated into English by T. Churchill under the title, *Outlines of a Philosophy of the History of Man*). In this work all the

rays of his genius converge. His aim is to represent the entire history of the race as a series of events pointing to a higher destiny than has yet been revealed. His love and reverence for humanity are intense, pure, passionate. An ideal humanity, it might almost be said, is his divinity, in whose service he labors with restless zeal. That enthusiasm, however, which made Herder so effective as a mover of men's minds, had its fatal compensation in a deficiency of artistic excellence. His writings have not that fine perfection of style and method which will enable them to float down the stream of time unmolested. Among his other works may be mentioned his *Gedichte, Volkslieder*, and the *Cid*, the last of which is considered by the Spaniards themselves to be truly Spanish in its spirit. See Herder's *Lebenbild*, executed by his son (Erlang. 6 parts, 1846–47,)

HERD GRASS. See BENT GRASS.

HEREDIT'AMENT, in English law, a comprehensive word, including everything that goes to the heir-at-law. It is often divided into corporeal and incorporeal. Thus, a house or land held in freehold is a corporeal hereditament; while tithes, advowsons, etc., are incorporeal, being merely rights in connection with corporeal things. The word includes some things personal as well as real, as when a chattel right is carved out of an estate of inheritance.

HEREDITARINESS. The influence exerted by parents on the qualities of their offspring is universally admitted, but the relative amount of influence which each parent exerts is still to some extent an open question.

The general structure of the body, the height, the degree of development of the bones and muscles, the tendency to obesity or leanness, etc., seem to depend as frequently on one parent as on the other, in the case of man; but in many animals, as the dog, horse, etc., the father most frequently determines the general form and the size of the body.

The color and complexion of the offspring follow no definite rule. Sometimes the colors of the two parents appear undiluted in the offspring, as in the case of a piebald colt, resulting from the union of a bay stallion and a white mare, while in other cases an intermediate tint appears in the young. In the offspring resulting from the union of individuals of the dark and white human races, we have this intermediate tint developed; but it is believed that the color of the father usually predominates over that of the mother.

A very curious department of this subject is the transmission to the offspring of special marks or deformities exhibited by one of the parents or more remote ancestors, and not common to the species. Nævus (or mother's marks), moles, harelip, growths of hair in unusual places, an unusual number of fingers or toes, and special malformations of the heart and of other organs, have been frequently traced to hereditary influence. It is deserving of remark that these peculiarities have a tendency to show themselves in alternate generations, or even at greater intervals. Burdach, Blumenbach, and other eminent physiologists, have held the doctrine, that parents (whether dogs or men) who have suffered accidental or intentional mutilation of certain parts (as, for example, the tail, fingers, etc.,) often produce offspring which inherit these injuries; for instance, the dogs with cropped tails often produce pups with cropped tails. If the facts are true (which possibly may be doubtful), the results are probably due to an impression on the mother's mind rather than to an hereditary tendency. The immemorial practice of the Chinese in stunting the feet of their women has not produced a natural variety with that peculiarity.

Morell, in his *Introduction to Mental Philosophy*, observes that there are latent powers or tendencies which have been inherited, and which often remain unknown until brought out by peculiar circumstances. He gives the familiar example of the pointer. The habit of pointing at game is originally an acquired one; but so strongly does this habit become seated in the race, that the very first time the young pointer is taken into the field, he will stand and mark it, thus developing a purely hereditary instinct. "Exactly in the same way," he adds, "we find in man peculiarities of mind, temper, thought, habit, volition, etc., appearing and reappearing in families and races. Lord Brougham found some of his grandfather's writing exactly resembling his own [which is very peculiar], though the grandfather had died before he was born, and his father's was quite different." It is alleged that the children of skilled artisans are, as a rule, more apt at petty manipulation than the children of ordinary laborers, and that hence the population of certain towns—Birmingham, for example—has a great advantage over that of other towns in point of manufacturing industry.

It is well known that longevity or the reverse, a tendency to great fruitfulness or to sterility, peculiarities in the degree of delicacy in the external senses, and a special tendency to certain diseases—as gout, pulmonary consumption, cancer, etc.—are frequently transmitted in hereditary descent from one or other parent to the offspring. The predisposition to any certain special disease may be transmitted by either parent; but where both parents have been affected, the offspring are especially liable to suffer from it. Deformities and diseases, also, engendered by circumstances to which the exposure is lifelong, or affecting successive generations, are more certainly and conspicuously hereditary.

Hereditary Tendency to Mental Disease.—As the mental constitution in general is eminently propagable, the hereditary tendency in mental disease is more familiar and better demonstrated than in other forms of morbid action. One observer attributes six-sevenths of the cases of insanity to this cause. In France, and among the affluent classes, one case in every three; among the peasants, one in every ten, is found to occur in families predisposed to alienation. In Italy, the proportion is nearly the same. When stating that derangement is traced to transmitted taint, expression is given to the complex proposition, that individuals who have inherited an unhealthy cerebral organization, or bodily qualities, such as anæmia, incompatible with sound mental action, fall victims more frequently and inevitably to insanity than those physically and mentally robust would do. Experience shows that as particular forms of physical degeneration, such as rickets, consumption, in like manner particular species of alienation, are propagated in families; that the suicidal impulse appears in one, while the uncontrollable and insatiable desire for stimulants, is the heritage of a third. There are certain laws by which this proclivity seems to operate. Not merely are there more females than males actually insane, but there are more hereditarily disposed to be insane. In connection with this it must be observed that women are more exposed by constitution to the exciting causes of insanity than males, and that as infants they more readily acquire the mental tone of the mother. But, moreover, the madness of the mother is more frequently transmitted than that of the father. French authorities record that of 467 cases of mental affections, 279 were traceable to the mother: an English physician similarly records 76 out of 133. Where the taint exists on the side of the mother, a greater number of children, and a greater number of daughters, are born of unsound mind. But this disposition to disease of the nervous matter is manifested in the same family by different members, in various forms—as epilepsy, mania, eccentricity, or delusions. Even the last are exhibited in successive generations. Oxford, who fired at the queen, his father, and grandfather, all believed themselves to be St. Paul—Holland, *Medical Notes*, etc.; Lucas, *L'Hérédité Naturelle;* and Galton's *Hereditary Genius*.

HEREDITARY PRIVILEGES AND POSSESSIONS. The question of the admissibility of hereditary rights and privileges has been much agitated with regard to three points, especially in more recent times. The first is hereditary monarchy. The "divine" right of kings is now little urged, being felt to be incompatible with modern notions of the political relations of society; and the defense of the hereditary transmission of the supreme power of the state is rather rested on the ground of political expediency and necessity. The animosities and disturbances of public affairs that attend the ever-recurring election of a head of the state are avoided, it is argued, by making power hereditary in a particular family, and by a determinate law of succession; while the dangers and disadvantages which might arise from an authority depending upon the chance of birth, are capable of being neutralized by institutions which prevent the monarch from doing harm, even if there were not every reason to hope that self-interest will lead him to use the power which is the birth-right of his family, for the permanent honor and advantage of that family, and, therefore, of the community with which it is indissolubly bound up.

Another and perhaps more difficult aspect of the question is with regard to hereditary classes, dignities, and offices in the state over and above the hereditary monarch. One thing is now universally agreed upon, that the transmission in individual families of dignities, rights, and offices, involving essential parts of government, such as the supreme dispensation of justice, and other attributes of sovereignty, is inconsistent with the very idea of a state. The splitting up of Germany into a maze of petty sovereignties arising out of fiefs of the empire become hereditary, is a signal instance of the dangers of this principle. A hereditary nobility with such rights is no longer considered defensible. It is another question whether, as a political institution, a class with certain hereditary privileges may not be advantageous or even necessary as an element of stability, and as affording a source of trained statesmanship. Society has a longer life than the individuals that compose it, and should have further-stretching views—"looking before and after;" and it is chiefly in the great historical families of a nation, that such extended views grow up and and are cherished—families whose traditions form part of the national history, and which naturally identify their future with the national prosperity and dignity. Besides their traditions and well-developed national instincts, the individual members of such families enjoy other advantages as political and social leaders. Their usually good education, and their well-secured possessions which, in addition to a high sense of honor, raise them above having recourse to petty shifts and jobs, make them valuable as examples and as administrators in a commonwealth which aims at dignity and stability. Carried to an extreme length, as was the case in France prior to the great revolution, the hereditary privileges of the nobility became a source of social discontent and disorder; but limited as in the United Kingdom, hereditary privileges and dignities are found to be no way incompatible with the utmost social expansion, and are in reality so popular as to be admittedly a happy feature in the structure of society. It is further to be observed, that as great families with privileges and titles are from time to time dying out, while others, through distinguished public services, are raised to the rank of nobility, that degree of infusion of new blood is kept up which

gives vigor to the system, and at least prevents the British aristocracy from degenerating into an effete or antiquated caste.—As regards the economic view of hereditary right to private property, see J. S. Mill's *Political Economy*.

HEREDITARY RIGHT, strictly speaking, means the right of succession as an heir-at-law. The foundation of this right is nothing but convenience, the principle being, that if a man does not by will appoint his own heir, the law will do it for him; and the law, in doing this, proceeds according to certain degrees of relationship. It is therefore a mistake to suppose that there is anything in mere hereditary right which is divine, or superior to that which results from the radical right of ownership. It is a secondary and substitutional right, the principal and primary right being that by which the owner of land is entitled to say who shall at his death enjoy that land.

HERE'FORD, a city, parliamentary and municipal borough, and capital of the co of the same name, is situated in the fertile and highly cultivated valley of the Wye, 134 m. w.n.w. of London. The principal building is the cathedral, a noble edifice, which, after having been substantially restored, was reopened in 1863. St. James's church, built in 1868, is an ornament to the city. A very interesting old map of the world, said to date from the 13th c., and other geographical works, are deposited in the chapter-house and library. Besides many other public buildings, Hereford contains numerous benevolent and educational institutions, among the latter of which are several important free schools. Among its manufactures, which, however, are inconsiderable, gloves, hats, and flannel are the chief. Of its five annual fairs, that held in Oct. is perhaps the largest in the co. for cattle and cheese. Hereford returns two members to parliament. Pop. '71, 18,347.

HERE'FORDSHIRE, an inland co. in the w. of England, is bounded on the w. by s. Wales, and on the e. by the counties of Worcester and Gloucester. Area, 534,823 acres. Pop. '71, 125,370. The surface of the co. is hilly, with occasional valleys opening into wide-spread plains. Among the chief hill-ranges, are the Black mountains on the western, and the Malvern hills on the eastern border of the county. The whole of Herefordshire is in the basin of the Severn, and the general direction of the streams is s.e. toward that river. The Wye, with its affluents the Lugg, the Arrow, and the Teme, are the principal rivers. The climate of Herefordshire varies with the elevation and the exposure, but, as attested by the general longevity of the inhabitants, is on the whole exceedingly healthy. The soil is for the most part a deep, heavy, red loam, which produces good crops of grain, chiefly wheat, and is highly favorable to the growth of trees. Oaks and apple-trees abound, orchards are numerous, and cider is made in great quantity. Sheep and cattle of excellent breeds are extensively reared, and in the n.w. of the co. a useful breed of horses is produced. Agriculture is the chief employment of the inhabitants.

Herefordshire, or at least the greater part of it, formed a portion of the territory of the ancient Silures, and was conquered by the Romans in about 73 A.D. During the so-called heptarchy, it was included in Mercia. From its position on the Welsh border—a portion of the co. being included in the debatable land called the "Marches"—Herefordshire was long the scene of frequent contests.

HEREN'CIA, a t. of Spain, in the province of Ciudad Real, and about 40 m. n.e. of the city of that name. It carries on manufactures of soap, has a large weekly market and a pop. of 6,400.

HERERO'LAND, a region of s.w. Africa stretching n. from the Kuisip to the Cunene; 100,000 sq.m.: pop. 184,000, of whom but 300 are whites. Hereroland has a coast of 460 m., but the only point where it offers shelter and access to ships is Walfish bay, a safe but comparatively shallow harbor formed by Pelican point immediately to the s. of the mouth of the Kuisip. The country consists of three distinct physical regions: first, a long and narrow coast district backed by a very regular line of hills, of which the highest point appears to be Mt. Messum or Dourissa; secondly, a broad mountainous tract; and thirdly, a steppe region which stretches away into the Kalahari desert. The rivers are mere wadies which only at intervals succeed in bringing water as far as the sea. Except in the half-dry river-beds, the coast district is almost destitute of vegetation, the only edible fruit being the *nara*, which grows on the sand-downs, and is, according to Anderson, eaten by oxen, mice, men, ostriches, and lions. In the mountainous tract there are places of considerable fertility; large trees, as sycamores, etc., grow along the river-beds, and euphorbias, tamarisks, and a variety of strong-spined bushes prevail. In a few favored spots wheat can be cultivated, and from a single grain as many as 150 stalks may be produced. The coast range and many of the mountains are composed of granite and gneiss, broken by intrusive quartz and porphyry; further e. limestone formations, both carboniferous and oolitic, are predominant; and these again give place to sandstone strata, worn by the weather into table-shaped eminences. The granite and gneiss are being disintegrated with great rapidity. Both iron and copper are said to occur in considerable abundance, though the mineral exploitation of the country has had no satisfactory result. About 25 mineral springs, both hot and cold, are known to exist among the mountains.

HERESY (Gr. *Hairesis*) primitively means a *choice* or *election*, and in its application to religious belief is used to designate as well the act of choosing for one's self, and maintaining opinions contrary to the authorized teaching of the religious community to which one's obedience is due, as the heterodox opinions thus adopted and the party which may have adopted them. In the Acts of the Apostles (see Acts v. 17; xv. 5; xxiv. 5; xxviii. 22), the word seems to be used of a sect or party, abstracting from the consideration of its character, whether good or bad; but in the epistles and in the early Christian writers it is almost invariably used in a bad sense, which is the sense uniformly accepted in all subsequent theological literature. The notion of heresy, as understood by theological writers, involves two ideas: first, the deliberate and voluntary rejection of some doctrine proposed by the supreme authority established in any church as necessary to be believed; and secondly, a contumacious persistence in such rejection, with the knowledge that the belief of the doctrine is required of all the members of that particular religious community. Roman Catholic writers, regarding the authority of their own church as supreme and final, apply the name of heresy to any formal denial of a doctrine proposed by the Roman Catholic church as necessary to be believed. Protestant writers seldom use the word, except in relation to what each sect regards as the essentials of Christian faith. Beyond this point, indeed, the idea of heresy has no proper place in the dogmatical system of the Protestant sects, especially in reference to other communions than their own. In the Roman Catholic church, the supreme authority may be either the decree of a general council approved by the pope, or a dogmatical decree of the pope himself, expressly or tacitly received by the bishops of the various churches; and in general the crime of heresy is incurred in any church by the rejection of a doctrine which in that church is held to constitute an essential and integral portion of the Christian faith. Apostasy is the complete abandonment of the whole Christian doctrine, and the renunciation of the Christian profession. If the intellectual error be accompained by full deliberation, and by full knowledge of the motives of belief, the heresy is called *formal;* should it arise from ignorance or imperfect knowledge, it is styled *material;* and the heresy is held to be imputable, or the contrary, according as this ignorance is vincible or invincible.

Even in the apostolic times, heresies had arisen in the church, and before the council of Nice, the catalogue of sects had already swelled to considerable dimensions. Without attempting any enumeration of these heresies, it may be said in general that the sects of the early centuries are all reducible to two classes: (1) Those which attempted to associate the Christian doctrines with Judaism; (2) Those which ingrafted Christianity upon the Gentile religions or the Gentile philosophies. And this latter class naturally subdivides itself into (1) The sects which were tinged with the errors of the oriental philosophy; and (2) Those which drew their errors from the Grecian schools. Of all these we find traces, more or less distinctly marked, in the sects of the later ages.

From the very date of the establishment of Christianity in the Roman empire, heresy appears to have been regarded as a crime cognizable by the civil law; and Constantine enacted several severe laws for its repression, which were continued and extended by his successors, and were collected into a single title, *De Hæreticis*, in the Justinian code. The penalties of heresy ordained by these enactments are very severe, extending to corporal punishment, and even to death; and they all proceed on the distinct assumption that a crime against religion is a crime against the state. These enactments of the Roman law were embodied in the various codes of the European kingdoms; and in considering the history of the middle ages, it is necessary to recollect that the principle above referred to, as to the social bearing of the crime of heresy and of other crimes against religion, pervades the whole system of mediæval jurisprudence. It is further to be remembered, that the principles of many of the mediæval sects were anti-social and communistical, as well as opposed to the doctrines of the church; and that their leaders, in many instances, by adopting violent and revolutionary means for the propagation of their doctrines, drew upon themselves the punishment of anarchy and rebellion, as well as of heterodoxy in religion. Still, with even these allowances, Catholic historians themselves admit that the mediæval procedures against heresy were in many instances excessive, as were, indeed, also the processes and penalties of the criminal code.

In English law (2 Hen. IV. c. 15), heresy consisted in holding opinions contrary to Catholic faith and the determination of Holy church; and by common law the offender was to be tried in the provincial synod by the archbishop and his council; and, after conviction, was to be given up to the king to be dealt with at his pleasure, the king being competent to issue a writ *de hæretico comburendo;* but the statute above referred to empowered the diocesan to take cognizance of heresy, and on conviction, to hand over the criminal directly, and without waiting for the king's writ, to the sheriff-major or other competent officer. This statute continued practically in force, with certain modifications, till the 29 Charles II. c. 9., since which time heresy is left entirely to the cognizance of the ecclesiastical courts; but, as there is no statute defining in what heresy consists, and as, moreover, much of the jurisdiction of the ecclesiastical courts has been withdrawn by the various toleration acts; and, above all, as the effect of various recent decisions has been to widen almost indefinitely the construction of the doctrinal formularies of the English church, it may now be said that the jurisdiction of these

courts in matters of heresy is practically limited to preventing ministers of the established church from preaching in opposition to the doctrine and the articles of the establishment from which they derive their emoluments, and that, even in determining what is to be considered contrary to the articles, a large toleration has been juridically established. See the recent trial of Dr Rowland Williams, and the judgment given by Dr Lushington in the court of arches. For the history and literature of heretical sects, see the various ecclesiastical historians, as also Stockmann's *Lexicon Hæresium* (Leip. 1719); De Cæsari's *Hæresiologia* (Rome, 1736); Fritz's *Ketzerlexicon* (Würzburg, 1834); Arnold's *Ketzerhistorie* (Frankfort, 1699); Walch's *Geschichte der Ketzereien* (Leip. 1762); and Hilger's *Darstellung der Hæresieen* (Bonn, 1837).

HERETICS, (HERESY, *ante*), *First century:* Simonians (so called from Simon Magus) Cerinthians (Cerinthus) Ebionites (Ebion) and Nicolaitans (Nicholas, deacon of Antioch). *Second century:* Basilidians (Basilides), Carpocratians (Carpocrates), Valentinians (Valentinas), Gnostics (Knowing Ones), Nazarenes, Millenarians, Cainites (Cain), Sethians (Seth), Quartodecimans (who kept Easter on the 14th day of the 1st month), Cerdonians (Cerdon), Marcionites (Marcion), Montanists (Montanus), Tatianists (Tatian), Alogians (who denied the "Word"), Artotyrites, and Angelics (who worshiped angels). *Third century:* Patripassians, Arabici, Aquarians, Novatians, Origenists (followers of Origen), Melchisedecians (who believed Melchisedec was the Messiah), Sabellians (from Sabellius), Manicheans (followers of Manies). *Fourth century:* Arians (from Arius), Colluthians (Colluthus), Macedonians, Agoetae, Appollinarians (Appollinaris), Timotheans (Timothy the apostle), Collyridians (who offered cakes to the Virgin Mary), Seleucians (Seleucus), Priscillians (Priscillian), Anthropomorphites (who ascribed to God a human form), Iovinianists (Iovinian), Messalians, Bonosians (Bonosus). *Fifth century:* Pelagians (Pelagius), Nestorians (Nestorius), Eutychians (Eutychus), Theo-paschites (who said all the three persons of the Trinity suffered on the cross). *Sixth century:* Predestinarians, Incorruptibles (who maintained that the body of Christ was incorruptible), New Agnoetæ (who maintained that Christ did not know when the day of judgment would take place), Monothelites (who maintained that Christ had in his two natures but one will).

HERFORD, a t. of Prussia, in the province of Westphalia, is situated close to the frontier of Lippe-Detmold, on the Werre, 17 m. s.w. of Minden. Yarn-spinning, linen-weaving, and carpet manufactures are carried on. Pop. '75, 12,012.

HE'RI, HERI-RUD, or HURI, a river of central Asia, which rises in the Hindu Kush mountains, about 150 m. w. from Cabul, pursues a western course through Afghanistan, for more than 300 m. through a fertile and beautiful valley, in which stands the city of Herat (q.v.); then bending suddenly to the northward along the boundary between Persia and Turkistan, and afterwards n.w. through Turkistan, it has a further course of fully 400 m., till it terminates in the swamp of Tejend, 150 m. to the e. of the Caspian sea. After entering Turkistan, the Heri soon begins to lose its water in the sand of the desert, and the latter part of its course for hundreds of miles is dry, except at certain seasons of the year.

HERING, CONSTANTIN, b. Saxony, 1800; studied medicine in Germany, and accompanied Wiegel, the botanist, on his scientific expedition to French Guiana. About 1834 he settled in Philadelphia, where he soon became favorably known as a homeopathic physician. Among his works are *Rise and Progress of Homeopathy*, *The Domestic Physician*, and various essays.

HERIOT, in English law, is a kind of fine due in copyhold estates to the lord of the manor on the death of the copyholder, and consists of the best beast, jewel, or chattel that belonged to the deceased. The lord can enforce this right by action, or seize it *brevi manu*. Such a right is practically unknown in freehold estates in England. In Scotland, all land is held on much the same forms as copyholds; and much more vexatious things of a similar kind to heriots, under the name of reliefs, become due from a vassal's heir to the superior on the vassal's death. In both countries the practice is equally barbarous.

HERIOT, GEORGE, founder of a magnificent hospital at Edinburgh, the son of a goldsmith in that city, a descendant of the Heriots of Trabroun, East Lothian, was born in June, 1563. Admitted in May, 1588, a member of the Edinburgh incorporation of goldsmiths, he was, in 1597, appointed goldsmith to Anne of Denmark, consort of James VI. of Scotland, and soon after to the king, on whose accession, in 1603, to the English throne, Heriot went to London, where, as court-jeweler and banker, he amassed considerable riches. He died Feb. 12, 1624, without issue, and bequeathed the greater part of his wealth (£23,625) to the town-council and ministers of Edinburgh, to found and endow an hospital in that city for the maintenance and education of the sons of poor deceased or decayed burgesses. The noble structure of Heriot's hospital, from a design, it is believed, by Inigo Jones, was completed in 1649, at a cost of £30,000 sterling. After the battle of Dunbar, in 1650, Cromwell made it a military hospital; but in 1658 it was restored to the governors by gen. Monk; and in 1659, 30 boys were admitted. 216 boys are now maintained and educated in it, 96 of whom are non-resident. In 1766 the annual revenue was £1966. In 1837 it amounted to £11,235, leaving, in that year, a

surplus of £3,099. The yearly revenue is now upwards of £20,000. Most of the ground on which the new town of Edinburgh is built belongs to the hospital. The revenues greatly exceeding the expenditure, in 1837 an act of parliament was procured for the erection of schools in Edinburgh, for the education of poor children free of all expense. Of these "Heriot schools" there are 19—viz., 12 juvenile and 7 infant schools—attended by upwards of 5,100 boys and girls. The children who are eligible to these schools are, first, children of decayed burgesses and freemen; and, second, children whose parents are in poor circumstances, and who reside within the royalty of Edinburgh; but of late admission has also been given to the children of parents residing beyond that limit. There are also 9 free evening-schools, attended by 1100 young men and women. There is a system of bursaries connected with the hospital, both for the boys who are educated in it, and for others who are elected according to the discretion of the governors—"house bursars," £30 a year; and "out-bursars," about £20; the former established in 1810, the latter in 1825.

HERISAU, the largest t. in the Swiss half-canton of Appenzell-ausser-Rhoden, at the confluence of the Glatt and Brühlbach, 7 m. n.w. of Appenzell, and 2,550 ft. above sea-level. The town is irregularly built, and extends over a large area. The church-tower, in which the archives are kept, is referred to the 7th century. Herisau has a public library, an arsenal, a new town-house, and a hospital, and is the seat of the cantonal council and of a district court of justice. The manufactures comprise muslin, cotton, and silk. Christianity was introduced at Herisau (a name during the middle ages Latinized as Augia Domini) about the beginning of the 7th century. The nobles of Herisau were its first superiors, but their power passed in 1390 into the hands of the abbots of St. Gall, from whose somewhat oppressive rule the people bought themselves free in 1463. In the neighborhood beautiful walks lead to the interesting ruins of the castles of Rosenberg and Rosenburg. The baths and goat's-whey cure of Heinrichsbad are about a mile to the north-east.

HERISTAL, or HERSTAL, a considerable village of Belgium, in the province of Liege, extends along the left bank of the Maas for about 3 m., immediately below the city of Liege, of which it may almost be considered a suburb. Pop. about 7,000, principally workmen, who find employment in the coal-mines, the iron and steel works, which are here carried on. Some ruins still exist of the castle of Heristal, the birthplace of Pepin le gros (father of Charles Martel, and great-grandfather of Charlemagne), and from which he had his title of Pepin d'Heristal.

HERITABLE BOND, in Scotch law, is a bond for a sum of money, and joined with it a conveyance of land in security thereof. The usual deed is now a bond and disposition in security, corresponding to the English mortgage (q.v.).

HERITABLE JURISDICTIONS, a remarkable class of jurisdictions held hereditarily from the crown of Scotland, abolished (1748) by 20 Geo. II. c. 43. These jurisdictions amounted to upwards of a hundred in number, and consisted of sheriffships, stewartries, constabularies, but principally of regalities and bailieries, with some offices of distinction. One of the more important was the office of lord justice-general, and the lordship of Argyle and the isles, both belonging to the family of Argyle. In virtue of their hereditary rights, the possessors of these jurisdictions exercised an arbitrary power over vassals and others within the limits of their domain, and could punish them by fines, scourging, imprisonment, and even in some cases put them to death, without interference of the common law. As repugnant to social policy, and more particularly with the view of extinguishing the authority of highland chiefs over their clans, these heritable jurisdictions were abolished; the possessors receiving payment for the assumed value of their rights. Argyle alone received £21,000 as an indemnity, and altogether there was paid by government £152,037 12s. 2d. The abolition of these odious jurisdictions being followed by the appointment of sheriffs on a proper footing, this great legislative act marks an important era in the history of Scotland.

HERITABLE AND MOVABLE, a Scotch law-phrase denoting the distinctions of things which go to the heir and to the executors respectively. The distinction corresponds to a certain extent to the phrase "heir and executor" (q.v.) in England.

HERITABLE SECURITIES, the name given in the law of Scotland to what are called mortgages and charges on land in England. These were formerly distinguished into wadset, infeftment of annual rent, heritable bond, bond and disposition in security, and absolute disposition with back-bond, and also reserved burdens on land. All heritable securities are founded on the theory that they constitute a pledge of the land to the creditor until the debt is paid, or rather the debt is a burden on the land, so that whatever becomes of the land, into whatever number of hands it is conveyed and transferred, the debt still inheres in it, and must be first paid out of the proceeds, unless it is redeemed. In Scotland the principal heritable security is now called the bond and disposition in security, which consists of an obligation to pay the debt, and a disposition *pro tempore* to the creditor, by way of security till the debt is paid. The bond must be registered in the register of sasines, to complete the title, and it is assignable to a third party. A power is always given to the creditor to sell the estate, if the principal or

interest is not paid, in which case the creditor must account for the surplus after paying himself his debt.

HERITOR, in the law of Scotland, is the owner of land in a parish liable to public burdens. The heritors, collectively, have vested in them the fee of the church and churchyard; they repair the parish church, etc., and before the education act (1872) elected the parish schoolmaster.

HERKIMER, a co. in e. central New York, on the Mohawk river, intersected by the Erie canal and the New York Central railroad; 1400 sq.m.; pop. '75, 41,586. The surface is generally hilly, rising in the n. part into a spur of the Adirondack mountains. The soil, especially along the Mohawk valley, is very fertile. Chief productions: cheese, butter, hay, broom-corn, potatoes, and cattle. Co. seat, Herkimer.

HERKIMER, NICHOLAS, 1720–77; b. N. Y.; son of J. J. Erghemar, whose name became corrupted to Herkimer, a German emigrant. Nicholas commanded at Fort Herkimer in 1758 when an attack was made by the French and Indians. In the war of the revolution he was a colonel and led a force to the relief of Fort Stanwix. In Aug., 1777, he was wounded in a skirmish with the Indians, and died from the effects of amputation. Congress voted a monument to him, but it was never built.

HERMÆ. See HERMES.

HERMANDAD, THE (Sp. "Brotherhood"), an association of the principal cities of Castile and Aragon, bound together by a solemn league and covenant for the defense of their liberties in seasons of trouble. These confederacies were sanctioned by the sovereigns, as agents for suppressing the increasing power of the nobles, and for maintaining public security through the land with no cost to the government. In Aragon, the first hermandad was established in the middle of the 13th c., and in Castile about 30 years later; while in 1295, 35 cities of Castile and Leon formed a joint confederacy, and entered into a compact, by which they pledged themselves to take summary vengeance on every noble who had either robbed or injured a member of their association and refused to make just atonement for the wrong; or upon any one who should attempt, even by the order of the king, to levy an unjust tax. During the long period of anarchy in which the Christian rulers of Spain were impotent to maintain order in their own dominions, the *Santa Hermandad,* or holy brotherhood, had presented the only check against the unbounded license of the nobles; and Isabella of Castile, seeing the beneficial effects which an extension of the institution was capable of producing, obtained the sanction of the cortes for its thorough reorganization and extension over the whole kingdom in 1496. The crimes reserved for its jurisdiction were all acts of violence and theft committed on the highroads or in the open country, and the penalties attached to each misdemeanor were specified with the greatest precision in the codes of laws which were enacted at different times in the yearly assemblies of the deputies of the confederate cities. An annual contribution was, moreover, assessed on every hundred householders or *vecinos* for the equipment and maintenance of the horsemen and *quadrilleros* or officials of the brotherhood, whose duty it was to arrest offenders and enforce the sentence of the law. Although the hermandad was regarded with much disfavor by the aristocracy, it continued for many years to exercise its functions, until the country was cleared of banditti and the ministers of justice enabled to discharge their duties without hindrance from lawless disturbers of the peace. In 1498, the objects of the hermandad having been obtained and public order established on a firm basis, the brotherhood was disorganized, and reduced to an ordinary police, such as it has existed, with various modifications of form, to the present century. The laws enacted at different times in the juntas or assemblies of the hermandad were compiled, in 1485, into a code, known as the *Quaderno de las Leyes nuevas de la Hermandad,* which was first printed at Burgos in 1527.—See Mariana, *History of Spain;* Pulgar, *Reyes Catolicos;* Prescott, *History of Ferdinand and Isabella.*

HERMANN, FRIEDRICH BENEDICT WILHELM VON (1795–1868). A distinguished political economist, b. Bavaria; studied at the universities of Erlangen and Würzburg. His attention was directed to mathematics and political economy, and in 1817 he opened a private school at Nuremberg. In 1823 he became *privat docent* at the university of Erlangen, and a few years later was professor of mathematics at Nuremberg. His great work, *Staatswirthschaftliche Untersuchen* (Economical Researches), appeared in 1832, and three years later he was made member of the royal Bavarian academy of science. His life was a succession of active and energetic service. He was inspector of technical instruction in Bavaria; in 1839 assumed charge of the bureau of statistics; in 1845 was one of the councilors of the interior; and in 1848 sat as member for Munich in the national assembly at Frankfort, where he was instrumental in organizing the so-called "great German party," and representative of their views at Vienna. In 1855 he attained the highest honor to which he could aspire, and became councilor of state. He published a large number of reviews and papers in the various German newspapers, and as head of the bureau of statistics he published a yearly report of high value

HERMANN, or HERMAN, a name that first appears in Germany in the 6th c. after Christ, but is now become common. It has been erroneously transferred to that prince

or chief of the Cherusci, called by Roman writers Arminius, and by the Greeks Armenios. This personage was the son of Sigimer, and was born 16 B.C. The period in which the youth of Hermann was cast was fraught with the greatest peril to Germany. To secure the frontiers of the empire against the attacks of the Germanic tribes, the Romans had been forced to advance into the more turbulent districts, and to build a series of forts to overawe the inhabitants. In this manner, not only had most of the Celtic tribes, from the Alps to the Danube, been subdued, but in the years from 9 B.C. to 4 A.D., Drusus and Tiberius had penetrated into the n.w. of Germany as far as the Elbe, laid out a number of military roads, erected fortresses in the country, and reduced the different tribes to such dependence upon Rome, as virtually amounted to complete subjugation. With so much prudence and caution had Tiberius proceeded, that the Germans continued to all appearance on the best terms with the Romans, gradually adopted Roman habits, and frequently and readily took service in the Roman armies. Thus Hermann and his brother Flavius had enrolled themselves under the Roman standards, and as leaders of Cheruscan auxiliaries, had not only obtained Roman citizenship and the rank of knighthood in the country of the Danube, but had likewise acquired a knowledge of the Latin language, and a deep insight into the arts of war and policy, as practiced by the Romans. Enriched with these experiences, when Hermann, after the expiration of some years, returned home, he found the state of affairs considerably changed for the worse, through the unskillful despotism of the Roman viceroy, Quintilius Varus. Hermann now conceived the plan of delivering his country from its oppressors. All the tribes and leaders as far as the Elbe were secretly summoned; Varus was lulled into security, and induced to dispatch portions of his army to different points, and with the remaining portion, which was just on the point of leaving the country of the Cherusci for the Rhine, to quit the highway. He was thus lured into the impassable districts of the *Teutoburg forest* (either in the upper valley of the Lippe, or the adjoining Prussian territory); an engagement took place, which lasted for three days. The result was the annihilation of the whole Roman army (9 A.D.). When intelligence of this defeat reached Rome, it excited the greatest consternation and anxiety. The Germans, however, who had only their own liberation in view, prosecuted their victory no further; and for a few years both parties, so to speak, hung fire. When Germanicus (q.v.), however (14 A.D.), assumed the command on the lower Rhine, he resolved to crush the barbarians. In two successive campaigns, 14 A.D. and 16 A.D., he reduced Hermann to great straits; but he being recalled to Rome by the emperor Tiberius, 17 A.D., the results of his victorious activity were lost. From this time no Roman army ever ventured to penetrate from the Rhine into the interior of Germany, and this circumstance, which decided the future fate of Germany, must be ascribed chiefly to Hermann. Nevertheless, no sooner was the foreign enemy expelled, than the internal feuds broke out with more violence than ever. In the course of these, Hermann was slain by his own relatives, in the 37th year of his age and 12th of his leadership. Tacitus says of him: "He was, without doubt, the deliverer of Germany; and unlike other kings and generals, he attacked the Roman people, not at the commencement, but in the fullness of their power; in battles, he was not always successful, but he was invincible in war. He still lives in the songs of the barbarians, though unknown to the annals of the Greeks, who admire only what belongs to themselves; by the Romans, he is not estimated according to his merits, because in our admiration for the past, we neglect the present."—Compare Wietersheim, *Der Feldzug des Germanicus* (Leip. 1850); Massmann, *Arminius Cheruscorum Dux ac Decus, Liberator Germaniæ* (1839); Böttger, *Hermann, der Cheruskerfürst* (Han. 1874).—A colossal statue of Hermann, placed on a hill near the town of Detmold, was publicly unveiled on Aug. 16, 1875. The work, intended to be a national monument, is by the sculptor Bandel, who devoted to its completion a large portion of his life.

HER'MANN, JOHANN GOTTFRIED JAKOB, a German philologist of great genius and learning, was b. at Leipsic, Nov. 28, 1772; studied there and at Jena, and was made, in 1798, extraordinary professor of philosophy. In 1803 he was called to Kiel as ordinary professor of eloquence, becoming, in addition, professor of poetry in 1809, and in this position he remained till his death, Dec. 31, 1848. Distinguished by liberal-mindedness and love of truth, by eloquence and extensive culture, Hermann continued till his latest days to attract a large circle of students to his class-room, which sent forth some of the most celebrated teachers in the schools and universities of Germany. The first department which he began to cultivate on original principles was the science of meter, of which he attempted to develop a philosophical theory from the categories of Kant; and on this subject he wrote, besides his *Handbuch d. Metrik* (1798), several Latin treatises, among which his *Epitome Doctrinæ Metricæ* (1818) reached a third edition in 1852. Of wider importance, however, was the new method which he introduced into the treatment of Greek grammar, which has had its influence on the grammar of Latin, and even of modern languages, especially of the German. The principles of this method are not only explicitly developed in his *De Emendendâ Ratione Græcæ Grammaticæ* (1801), but are practically illustrated in his numerous editions of the ancient classics. Hermann's power of dealing with chronological, topographical, and personal questions, is shown in his *Opuscula* (7 vols., Leip. 1827–1830), which also contain some poems breath-

ing the spirit or Roman poetry. Consult Jahn's *Gottfried Hermann eine Gedächtnissrede* (Leip. 1849).

HERMANNSTADT (Lat. *Cibinium*, Hung. *Nagy-Szeben*), an important t. of Austria, capital of the crown-land of Transylvania, is beautifully situated on the Cibin, or Zibin, an affluent of the Aluta, about 70 m. w.n.w. of Cronstadt. Hermannstadt is the seat of the Austrian governor of Transylvania, and of a Greek non-united bishop, and is the head-quarters of the 12th corps of the imperial army. Tanning, wax-bleaching, and the making of cloth, combs, paper, and gunpowder, chiefly employ the (1869) 18,998 inhabitants, half of whom are Protestants.

Hermannstadt, originally a village, is called, on the ancient seal of the town, *Villa Hermanni*. The *Hermann* from whom the town has its name was a citizen of Nuremberg, and is said to have led hither a colony in the 12th century.

HERMAPH'RODITE, in botany, the term used to designate those flowers which contain both the male and female organs of reproduction (stamens and pistils), and are therefore by themselves capable of producing perfect seed. Flowers containing only male or female organs are called *unisexual* or *diclinous* (q.v.), and when produced on the same plant, *monœcious* (q.v.); when on different plants, *dicecious*. Hermaphrodite flowers are also called *monoclinous* (Gr. *monos*, one, and *kliné*, a couch) and *perfect* flowers.

HERMAPH'RODITE BRIG, or BRIGANTINE. See BRIG, *ante*.

HERMAPH'RODITISM is a term employed by naturalists to designate the state or condition of those organisms, whether animal or vegetable, in which the sexual characteristics of the male and female are united in the same individual. The name is derived from the fable of the union into one, of the bodies of Hermaphroditus, son of Hermes and Aphrodite, and the nymph Salmacis. See Ovid's *Metamorphoses*, lib. iv. v. 347.

There are two kinds of hermaphroditism, the true and the spurious; in the former, there is an actual co-existence, in the same individual, of male and female reproductive organs; while in the latter, there is only an appearance, from arrest or excess of development, of a union of the distinctive organs of both sexes. True hermaphroditism is the normal type of sexual structure in most plants. See HERMAPHRODITE, in botany. It likewise occurs normally in many of the lower invertebrata, and as a monstrosity in the higher invertebrata, and even occasionally in certain vertebrata.

The recent investigations of Balbiani show that certain infusoria (as, for instance, the common green paramœcium), at all events occasionally present the phenomena of hermaphroditism. In some of the polyps (as, for example, the hydra and some of the actiniæ), the sexes are united in the same individual; the same is the case with some of the acalephæ (namely, the ctenophora), with certain orders of helminthes or parasitic worms (the cestodes and trematodes), with certain annelides (the hirudinei and lumbricini, of which the leech and the earth-worm are typical examples), with many acephalous mollusks, with the pteropods and with most of the gasteropods; while in the highest order of mollusks, the cephalopods, the sexes are always distinct. Among the crustaceans, the cirrhipeds are for the most part hermaphrodites; but in the other and higher orders, if hermaphroditism exists, it is only as an abnormal occurrence, and gives rise to a monstrosity. (For example, the common lobster has been observed with male organs on one side of its body, and female organs on the other.) True but not normal hermaphroditism is also occasionally met with in insects. In 14 cases given by Oehsenheimer, the right side was male, and the left female; and in 9 cases it was the reverse. Prof. Owen remarks that in insects hermaphrodites are occasionally found, where the characters of one sex, instead of extending over one-half, are limited to particular parts of the body which agree in the main with the other sex. Thus, in an individual of *gastrophaga quercus*, the body, the antennæ, and the left wings were those of the female, while the right wings were those of the male.

True (but of course abnormal) hermaphroditism is far rarer amongst the vertebrata than in insects or crustaceans. Various instances, however, are on record of fishes presenting a lateral hermaphroditic structure, or a roe on one side and a milt on the other; and references to various cases that have been reported may be found in sir James Y. Simpson's learned and elaborate article, "Hermaphroditism," in *The Cyclopædia of Anatomy and Physiology*. The same article may be referred to for cases of similar hermaphroditism in birds and mammals, including the human subject, namely, cases in which there were female structures on one side, and male structures (more or less perfect) on the other.

Returning from these cases of abnormal true hermaphroditism to those of normal true hermaphroditism, the question naturally suggests itself—Can these true animal hermaphrodites, possessing male and female organs, fertilize themselves? As far as is known, none of the terrestrial hermaphrodites, such as land-mollusks (the common snail, for example) and earth-worms, are self-impregnating. They all pair, and in this respect offer a strong contrast with hermaphrodite plants. But of aquatic animals, there are many self-fertilizing hermaphrodites. For further details on the subject of hermaphroditism generally, the reader is referred to Steenstrup's *Untersuchungen über das Vorkommen des Hermaphroditismus in der Natur* (1846).

Spurious hermaphroditism is a subject of too purely a professional character to be noticed at all fully in these pages. Those who take an interest in this subject may be

referred for further information to sir James Y. Simpson's article, and to a case recorded a number of years ago in the *Lancet* by Dr. Girdwood.

HER'MAS, the name of one of those who were members of the Roman church at the time at which St. Paul wrote his epistle to the Romans, and, as may be inferred from the apostle's addressing a special greeting to him, a person of some eminence among his fellow-Christians. He was, though resident at Rome, most probably, judging from his name, of Greek origin. Hermas, however, has obtained even more consideration from the circumstance of his being the reputed author of the well-known early treatise, called *The Shepherd*, which is commonly classed among the writings of the apostolic fathers. It is ascribed to the Hermas of St. Paul, more or less positively, by Origen, Eusebius, and St. Jerome. But there is a second Hermas, who lived about the middle of the 2d c., a brother of Pius I., bishop of Rome, to whom the work is attributed by other writers, and it would seem with greater intrinsic probability. The work contains many allusions which appear to be directed specially against the Montanistic errors—a fact quite irreconcilable with the supposition of its having been written in the apostolic age. *The Shepherd*, whichever Hermas may have been its author, seems to have been originally written in Greek. However, until recently, it was known only by a Latin version, with the exception of some Greek fragments collected from the quotations of the work by the Greek fathers. But in the year 1856 a Greek text, said to have been found at Mt. Athos, by the since too notorious M. Simonides, was published at Leipsic, the genuineness of which is more than doubtful; and an Ethiopic version was printed in 1860 by M. Antoine d'Abbadie, the well-known Abyssinian traveler and scholar. *The Shepherd* is a mystical work, divided into three parts—the first containing four "Visions;" the second, twelve "Precepts;" and the third, ten "Similitudes." It has been described as the *Pilgrim's Progress* of the early church; and although it contains but little of positive dogmatic teaching, is a most interesting monument of the Christian life of that period.

HERMENEU'TICS (Gr. *Hermeneutes*, an interpreter), the science of interpretation, especially as applied to the Holy Scriptures. It forms a branch of the same general study with exegesis (q.v.), and indeed is often confounded with that science; but the distinction between the two branches is very marked, and is perhaps sufficiently indicated by the etymology of the names themselves. To hermeneutics properly belongs the "intepretation" of the text—that is, the *discovery* of its true meaning; the province of exegesis is the "exposition" of the meaning so discovered, and the practical office of making it intelligible to others in its various bearings, scientific, literal, doctrinal, and moral. Hence, although, as will be seen by reference to the article EXEGESIS, the laws of interpretation have many things in common with those of exposition, it may be laid down that to the especial province of hermeneutics belongs all that regards the text and interpretation of the Holy Scripture; the signification of words, the force and significance of idioms, the modification of the sense by the context, and the other details of philological and grammatical inquiry; the consideration of the character of the writer or the persons whom he addressed; of the circumstances in which he wrote, and the object to which his work was directed; the comparison of parallel passages; and other similar considerations. All these inquiries, although seemingly purely literary, are modified by the views entertained as to the text of Holy Scripture, and especially on the question of its inspiration, and the nature and degree of such inspiration.

So far, there is but little difference between Roman Catholic hermeneutists and the more strict school of Protestant critics. It is at this point that the fundamental distinction between Catholics on the one side, and Protestants of every shade on the other, may be said to begin. With the latter, the sense of the Scripture once truly ascertained from the Scripture itself, interpreted by the rules explained above, is regarded as final, and is accepted by the interpreter as the revelation intended by God. With the former, the individual judgment which is formed upon these rules, and which, as to the actual meaning of the particular passage, may possibly coincide with that of the Protestant, is still controlled, and, it may be, overruled by the authoritative interpretation of the church, as conveyed in the decrees of councils, or the dogmatical definitions of pontiffs accepted by the universal church. From this circumstance it is often inferred that in the Roman Catholic church the science of hermeneutics is a nullity, and that no freedom of interpretation is practically permitted. The Roman Catholic critic, however, maintains that he exercises, and is free to exercise, on the text of Scripture the same liberty of interpretation which the Protestant may claim; and that it is quite possible that he may arrive at precisely the same conclusions with the Protestant as to the meaning of *the scriptural text considered in itself alone*. But he differs from the Protestant in believing that the Scripture does not contain the whole of God's revelation, and, therefore, that, as one passage of scripture is modified by another, so the scriptural revelation itself may be modified by other revelations of God conveyed to us through other mediums; as, for example, that of tradition. See TRADITION. As regards the literature of hermeneutics, most of the writers named in the article EXEGESIS have dealt with both branches of the science. They are for the most part Protestant. The most remarkable modern Catholic hermeneutical writers are Hermann Goldhagen (Mainz, 1765); Seemüller's *Hermeneutica Sacra* (1779); Mayr's *Institutio Juaup. Sacri* (1789);

Jahn's *Enchiridion Hermen.* (Vienna, 1812); Arigler's *Hermeneutica Generalis* (Vienna, 1813); Unterkircher's *Hermeneutica Biblica* (1831); Ronolder, *Herm. Bibl. Principia Rationalia* (Fünf Kirchen, 1838); Schnittler, *Grundlinien der Hermeneutik* (1844); Glaire's *Hermeneutica Sacra* (1840).

HERMES, the name of a divinity more familiarly known as Mercury, the god of speech, eloquence, the sciences, traffic, theft, and herds. Under this name are comprised several mythological personages, who personified the external expression of thought, whether human or divine. The principal of these are Teti, Thoth, Theuth, or Taut, the Egyptian Hermes, the Greek god properly so called, the Phenician Taaut, the Carthaginian Sumes, the Etruscan Turms, the Chaldæan Duvanai, and the Latin Mercurius. The oldest of these was undoubtedly the Egyptian, whose worship appears as early as the 11th dynasty. Thoth was generally represented with the head of an ibis (*heb*), which was his living emblem, and expressed his name in hieroglyphs. These, according to the legends, he had invented and revealed to the monarch Thamus. Many religious books were believed to have been written by him, and all literary compositions were dedicated to him. He was scribe or clerk of the gods, and in the future state justified the good against their accusers, as he formerly had Osiris in the trial of that god and Typhon. In the contest between Osiris and Typhon, when Horus had torn off the diadem of his mother Isis, Thoth is reported to have replaced it with the head of a cow. Locally, he was lord of Sesenu, Hermopolis, the modern Eshmunin, but his worship was universal. He was a self-created, self-existent god, although some legends of later date make him the son of Chnumis, or of the Nile. In his celestial character he was identified with the moon, *aah*, and was supposed to preside over that luminary, and the souls which made it their habitation. He inscribed also the names of monarchs on the *asht* or Persea, the tree of life of the Egyptian paradise.

In the Phenician mythology, Taaut or Hermes seems derived from the Egyptian, and he was the son of Misor or Egypt, inventor of writing and the sciences; while another form of his name, Sumes, is that of the Punic Hermes of Carthage. It is, however, clear that the name of Taaut is derived from the Egyptian Tet, "word" or "speech." The tradition of Hermes has passed to the Arabs, who recognize two Hermes, one who lived 1000 years after Adam, called by the Chaldees Ouriai or Duvanai, the great master; another, surnamed Thani, doctor of the world, and liberator of men from error, a prophet and philosopher; and Trismegist, the thrice-great, who lived at Calovaz, in Chaldæa.

But the most important of all was the Greek Hermes. The various traditions which make him the son of the Egyptian Nilus, whose name was never pronounced, or the sacred Thoth, are clearly Egyptian; that which derives his origin from Ouranos, and Hemera, is probably the Phenician myth. But the principal Hermes in whom the actions of the others centered was the son of Zeus and Maia, b. on Mt. Cyllene, in Arcadia, and originally a Pelasgian divinity who presided over cattle and commerce. His birth is placed subsequent to that of Apollo. Four hours after, according to the hymn, he left his cradle, and having found a tortoise, invented the *chelys*, or lyre, using its shell as a sounding-board, and making the strings out of the entrails of a sheep. At nightfall he stole fifty of the sacred herd of Apollo from Pieria, drove them to the banks of the Alpheius, slaughtered and dressed two of them. To escape detection, he had bound his feet with branches of the myrtle and tamarisk. Apollo, missing his cattle, dragged Hermes before Zeus, at Olympus, who condemned him to restore them; but Apollo, enchanted by the sound of the newly-invented lyre, offered Hermes his cattle in exchange, gave him his whip or goad, taught him how to tend cattle, and presented him with the caduceus. In the *Iliad* and *Odyssey* are no traces of his thievish propensities, which were introduced by the later poets. In the Gigantomachia he liberated Zeus from Typhon, and restored him his limbs. Hermes was messenger, herald, and ambassador of the gods; he bound Prometheus to Caucasus; killed Argus with the hundred eyes; liberated the wandering Io, etc. In the events of the Trojan war, he conducted the goddesses to the fatal judgment of Paris, brought Priam to Achilles, and was patron of Ulysses, to whom he gave the herb molys, to liberate him from Circe. Many heroical and other personages were descended from him. As god of the sciences, he invented the alphabet from the flight of cranes, astronomy, and numbers, weights and measures, music, the lyre, and syrinx, gymnastics, tactics, and the cultivation of the olive. Many festivals were celebrated to him in northern Greece and the islands, as at Phenea, Cyllene, and Athens; and some of these Hermæa resembled the Saturnalia, slaves being served on these occasions by their masters. His worship, in fact, extended all over the Peloponnesus, the islands of the Ægean, Asia Minor, and even Hesperia or Magna Græcia. Amongst animals, the tortoise, pig, lamb, and goat, and the young of beasts, were sacred to him; the ibis and the gull (*larus*) amongst birds; and the palm-tree, black-thorn, cinque-foil, and purslane amongst plants. Hermes had a local worship in Samothrace, where he appeared as one of the Cabiri, under the name of Casmilos, the son of Hephaistos or Vulcan, and Cabira. In the Eleusinian mysteries, he was represented by the hieroceryx.

The idea of Hermes seems to have been developed from two origins—the ancient Pelasgic or Arcadian god of shepherds, subsequently considered the patron of barter, of

commerce, without any trace of intellectual qualities; and the Phenician or Egyptian Hermes, introduced by commerce into Greece, with all the attributes attributed by the Orientals to their deity. In art, a similar development is seen from the old squared trunks or pillars, called hermæ and hermidia, retained till a later period, but by degrees ornamented with a bearded head, to which sometimes are added phallic symbols, the destruction of which at Athens before the sailing of the Sicilian expedition led to a fearful tumult, and the fall of Alcibiades (q.v.). In later, but still archaic art, he is represented bearded, wearing the broad-brimmed petasus, and holding the twisted caduceus. At the time of Phidias, he was represented unbearded, with curly hair, a crafty and charming expression, and the form of an athlete. Instead of the petasus, wings are sometimes arranged in his hair; his boots are winged, and his caduceus has two snakes attached to it. His form is naked, but often has a *chlamys*, or cloak, doubled upon his shoulder, and his hand holds a purse of money; while the cock, referring to his invention of the gymnasium, or the hours of business; the tortoise, allusive of his discovery of the lyre; the palm-tree, emblem of his invention of letters; the goat, referring to his charge of herds and paternity of Pan; and even the dog, allying him with Anubis, are placed at his side. The most remarkable type of the god was as carrying a ram upon his shoulders (*criophoros*). The caduceus was gilded at the top, painted blue in the middle, and black at the handle.

The Etruscans seem to have derived his worship directly from the Greeks, and represent him with the same attributes and type, but with the Etruscan name *Turms*, as the Camillus of the gods. His worship passed into Rome, under the name of Mercurius, or Mercury, by which he is more familiarly known, supposed to be derived from *mercari*, to traffic. There was something mystic in his cult, for the *feciales* did not know his nature, and he originally had the laurel instead of the caduceus, and the name of his mother Maia had been given to the month Maius, or May, on the 15th day of which his festival was held. As early as 259 A.U.C., he had a temple near the Circus Maximus, and his statue in that locality held a purse. At the Porta Capena, there was a well sacred to him, and the merchants sprinkled themselves and their goods with the holy-water obtained by dipping a laurel branch into the well. Tradition made him the father of Evander by the nymph Carmenta, and of Larea by the goddess Lara; but the Romans adopted into their religious system the Greek traditions, although, at a later time, under the empire, the influx of foreign religions made them confound him with the Egyptian Anubis, and even represent him with a dog's or jackal's head, and depict him of a golden or black color. His worship had even penetrated to Gaul, where he was adored under the name of Teutames.—Grüber, *Altklass. Wörterbuch Voce;* Gerhard, *Griechisch. Mythol.* (8vo. Berl. 1854, i. 260; Hartung, *Rel. d. Römer* (8vo. Frib. 1843); Birch, *Gall. Antiq.*, pp. 26, 27; Müller, *Arch. d. Kunst*, p. 560.

HERMES, GEORGE, a Roman Catholic philosopher and divine of Germany, whose system has been the occasion of a long and acrimonious controversy, was b. at Dreyerwalde, in the diocese of Paderborn, in Westphalia, April 22, 1775. Having received his early education from his parish priest, Hermes entered the gymnasium of Rheina, and thence was transferred, in 1792, as a theological candidate, to the university of Münster, where he speedily distinguished himself, as well by his ability and acuteness, as by his piety and exemplary life. In 1798 he was appointed professor in the gymnasium of Münster; and after nine years, he was named professor of theology in the university of the same place. His lectures being of a popular character, and addressed mainly to the examination of the modern philosophical systems, and thus bearing on revelation, attracted many hearers, and established for Hermes a high reputation in Germany; and when, in 1819, the new mixed university of Bonn was established, Hermes was appointed to a professorship of theology. His early reputation attended him here, and students flocked to his lectures from all parts of Germany, and even from the low countries. In this office he continued until his death, which occurred May 26, 1831.

The great object which Hermes appears to have proposed to himself was to counteract the influence of the philosophical systems, which, when he entered on his career as a professor, were in the enjoyment of their full popularity, and especially that of Kant; and with this view, he sought to deduce the foundations of all philosophical inquiry from the same first principles from which the Kantian philosophy takes its departure. His system, therefore, presupposes in the mind, as the starting-point of all rational inquiry, a blank condition, which, as variously described by friends and enemies, is either simply the absence of all previous conviction, or a state of positive doubt, analogous to the so-called pyrrhonism of the ancient schools. The Hermesian method of investigation, in like manner discards, in the first stages, and so far as investigation is permitted to extend, all principle of authority; and in the details of metaphysical inquiry, in the selection of the arguments of the existence of God, and of the nature of divine attributes, he departed widely from the old text-books of the schools; although in the general sum of the doctrines of the Roman Catholic church, his orthodoxy does not appear to have been in any degree called into question. The objections which arose lay rather against his method than against its actual doctrinal results.

It is remarkable, too, that although his work, *Einleitung in die Christ-Katholische Theologie* (Introduction to Christian-Catholic Theology), was published in 1819, and again

in 1831, it was not until after Hermes's death that the controversy regarding his system took a definite form, and eventually, at the instance of Clement Augustus Droote-Vischering, archbishop of Cologne, was referred to Rome. It would be out of place here to enter into the particulars of the controversy which ensued, the chief assailant of the system being a learned Italian professor of the collegio Romano, the Jesuit, father Perrone; while its defenders were almost exclusively Germans, most of them Hermes's own friends and pupils. The controversy was a very protracted one; and a very large, although, it must be confessed, excessively dull and misty literature, has grown out of the subject. It will be enough to say, that after a protracted examination, the doctrine of Hermes was condemned by a brief, dated Sept. 26, 1835. The German partisans of Hermes, who had at their command a theological journal of considerable circulation, the *Journal of Bonn*, protested from the first against this condemnation, to which they applied, at least practically, the well-known distinction of "fact" and "right," which had been long ago employed by the Jansenists; contending, that although the doctrines contemplated by the brief were rightly condemned, as being unsound and untenable, yet no such doctrines were taught by Hermes, or contained in his book. Two of the leaders of the party, profs. Braun and Elvenich, went to Rome to urge a reconsideration of the condemnatory decree; but their mission was unavailing, and the decision was ordered to be enforced without reserve. The archbishop of Cologne accordingly insisted on unqualified submission; and the troubles which arose from the opposition which he encountered, tended much to complicate the difficulties of a conflict which arose between him and the Prussian government, as to the question of "mixed marriages," and which led eventually to his arrest and deprivation by the crown. The controversy was continued, as well in Rome as in Germany, for a considerable time; by degrees, however, the Hermesian party fell away. The professors of various universities, individually or in bodies, accepted the papal condemnation; and although some have still persevered in their resistance down to a comparatively late period, they have been almost exclusively of that extreme party, many of whom openly seceded from Rome, under the name of the German Catholic church, and whose principles go even beyond orthodox Lutheranism, and may be regarded as verging on the most advanced borders of rationalism.

HERMET'IC BOOKS. Amongst the Egyptians, all books or literary compositions appear to have been dedicated to Thoth, and notices of this nature are appended to several papyri. The earlier religious books, such as the Ritual, were supposed to have been written by the fingers or under the dictation of the god Thoth himself, and several chapters of this and other works are stated to have been found on monuments written by the god. Hence the word hermetic, taken in its most extended sense, meant inspired, as Thoth was the scribe of the gods. Various traditions prevailed as to the number and nature of these books. Clement of Alexandria mentions 42 hermetic books, which contained the sum of all knowledge, whether human or divine; while others, as Iamblichus, raise their number to 20,000; and Manetho gives the astronomical cipher of 36,525. The series of books mentioned by the great authors were: 1. Sacred hymns of Osiris; 2. On the Life of a King; 3–6. Astrological precepts and observations; 7–17. Cosmography, geography, and chorography of Egypt and the Nile; 18–27. Laws and discipline of priests; 28–33. Medicine. Portions of these books have been undoubtedly found in the hieratic papyri. Under the name of hermetic books, several writings, principally in Greek, have been handed down, which pretend to be translated from the Egyptian, and similar books may have existed in the 2d century. But these books contain notions of the Neo-Platonic school of Phorphyry and Iamblichus, and appear to be intended as philosophical works giving an explanation of the genesis of the cosmos, the nature of God and man, in antagonism to the books of the Old and New Testament, from sources partly Egyptian, partly Persian and Rabbinical, and other traditions of the Alexandrian school. The name of hermetic writings was partially affected by the alchemists and astrologers of the middle ages, as the *Tractatus Vere Aureus*, by Dominicus Gnostus, in 1610; the *Tabula Smaragdina*, or "Emerald Table of Alchemy," in 1541; and various others. The principal tenets of the hermetic books are, that the Creator made the Cosmos by his word out of fluid; that the soul is a union of light and life, and proceeded from the cosmic soul; that death and life are only changes, and that nothing is destructible; that the soul transmigrates; that passion or suffering is the result of motion.—Baumgarten-Cruzius, *de Librorum Hermeticorum Indole* (Jena, 1827); *Hermes Trismegistus*, a Scheible (12mo, Stuttg. 1855); *Hermes Trismegistus* (*Poemander*) a Parthey (8vo, Berol. 1854).

HERMIAS, a slave of Eubulus, tyrant of Atarneus, Asia Minor, and succeeded him on the throne in 347 B.C. He was a favorite of Eubulus, and was treated as a freeman, being permitted to go to Athens where he made the acquaintance of Plato and Aristotle. The latter spent some years at Hermias's court, but fled when Artaxerxes captured Hermias, who was put to death. The philosopher erected a statue in his honor and married one of his relatives.

HERMIT (Gr. *erimites*, Lat. *erimita*, an inhabitant of the desert), one of the names given in the early ages, and still more in the later church, to a class of solitary ascetics, who, with a view to more complete freedom from the cares, temptations, and business of the world, withdrew from the ordinary intercourse of life, and took up their

abode in natural caverns or rudely formed huts in deserts, forests, mountains, and other solitary places. In the first centuries, the names of eremite and anchorite (q.v.) were indiscriminately applied to these solitaries; but the word *eremita* having been adopted into Latin, it is more commonly used in the modern languages which are derived from the Latin; and the Germans use the name *einsiedler*, which is of the same signification. The hermits of the middle ages, like the primitive anchorites, often lived in complete solitude; but a much more common, and, in its influence on the church, more important form of the institute, was that of a community of hermits, each possessing his separate hermitage, but all meeting at stated times for mass, prayer, religious instruction, and other common and public exercises. The various hermits of this class are regarded as constituting religious orders, and although never attaining to the popularity which distinguished the Franciscans, the Capuchins, the Dominicans, and other active orders, they form, nevertheless, a numerous and not uninfluential element in the spiritual life of the Roman Catholic church. It is beyond the scope of this work to enumerate all the eremitical orders. The most remarkable are—the hermits of St. Augustine, who trace their origin to the holy father of that name, but are subdivided into several varieties, which had their rise in the 11th, 12th, and 13th centuries; the Camaldolese, founded by St. Romuald in 1012; the Celestines, a branch of the Franciscans, established by Peter Murrone, afterwards pope Celestine V.; the Hieronymites (q.v.), established first in Castile in the 14th c., and thence introduced into other parts of Spain and into Italy by Lope d'Olmeda in 1424; and the Paulites, so called from St. Paul, the first hermit, but an institute of the 13th c., which had its origin in Hungary, and attained to a wider extension and a greater popularity than perhaps any other among the eremitical orders. —See Helyot, *Histoire des Ordres Religieux;* also Wetser, *Kirchen Lexicon* art. *Einsiedler.*

HERMITAGE, the cell or hut of a single hermit, and sometimes the aggregate of the cells occupied by the members of a single community. Many of these, from the reputation of their inmates, or as being the scenes of certain popular miraculous legends, attained great celebrity, and became the nuclei of important ecclesiastical establishments, and, in some instances, large and populous cities.

HERMIT CRAB, the common appellation of a large family (*paguridæ*) of crustaceans, of the order *decapoda,* and sub-order *anomoura* (see CRAB), having the abdominal or tail segments much more largely developed than in true crabs, but undefended by hard plates, and not forming an organ for swimming, as in lobsters, prawns, and other *macroura.* The soft and tender tail requires a protective covering, which the instinct of the hermit crabs leads them to find in some turbinated univalve shell of suitable size. The most common British species (*pagurus bernhardus*) is an interesting object to every visitor of the sea-shore, and may be found in abundance wherever little pools are left by the tide on a rocky or shelving coast. Shells of whelks, periwinkles, etc., may be seen moving about in the pools in a manner very different from that in which they were carried by their original molluscous owners, having now become the property and habitations of hermit crabs, by which, perhaps, the mollusks were eaten. On the slightest alarm, the hermit crab retires into the shell, guarding the aperture of it with one claw, which is much larger than the other, the hard points of the feet also projecting a little. The whole structure of the animal is adapted to such a habitation. The part which in the lobster becomes a finlike expansion at the end of the tail, becomes in the hermit crab an appendage for firmly holding by the shell; and so firmly does the hermit crab hold, that it may be pulled in pieces, but cannot be pulled out. Some species have suckers to render the hold more perfect. Increase of size, however, renders it necessary for hermit crabs to relinquish their old shells and seek new ones. Hermit crabs are very interesting inmates of the aquarium, but their locomotive habits and their voracity make them unsuitable for an aquarium otherwise very finely stocked. They feed on mollusks, and on all the animal garbage of the sea-shore.—Some of the hermit crabs of warmer climates are much larger than the British species; some of them (genus *cœnobita*) inhabit land-shells, and some are found even at a distance from the sea.

HERMODAC'TYL (Gr. *hermes,* mercury, and *dactylos,* a finger) is the name of a medicine that had a high repute among the later Greek and the Arabian physicians, as a remedy for gout and rheumatism. It is mentioned by Alexander of Tralles, who flourished 560 A.D.; Paulus Ægineta, who lived a century later; Avicenna, Serapion, etc. By some of the old writers, it was termed *anima articulorum,* or *the soul of the joints.* Corms, probably of several species of colchicum, are still sold in Greece and in the east under the name of hermodactyls. While sir H. Halford and others have advocated the view that hermodactyls are the corms of *colchicum autumnale,* different botanists and pharmacologists have referred them to *C. illyricum, C. variegatum, C. bulbocodiodes,* etc. No modern experiments have been made to determine the activity of hermodactyl, and the subject is one rather of historical than of practical interest. See COLCHICUM.

HERMOGENES, of Tarsus, a Greek rhetorician, who flourished in the reign of Marcus Aurelius. His precocious ability secured him a public appointment as teacher of his art while as yet he was only a boy; but at the age of 25 his faculties gave way, and he spent the long remainder of his life in a state of intellectual impotency. In the nine or ten years, however, of his activity, he composed a whole series of treatises on rhetoric, which became popular text-books, and the subject of subsequent commentaries.

HERMON, one of the highest mountains in Syria (9,150 ft. above the Mediterranean), an outlier of the Anti-Lebanon. The Sidonians call it Sirion, and the Amorites Shenir. Some part of this mountain near Cæsarea Philippi was probably the scene of the Transfiguration. The modern name is *Jebel esh Sheikh*, or "chief mountain." It is also called Jebel eth Thelj, "snowy mountain." The ridge of Hermon, rising into a dome-shaped summit, is 20 m. long, extending n.e. and s.w. The formation is a hard, dark-gray crystalline limestone belonging to the Neocomian period, and full of fossils. The spurs consist in some cases of white chalk covering the limestone and on the s. there are several basaltic outbreaks. The mountain in spring is covered with snow, but in autumn there is occasionally none even in the ravines. To the height of 500 ft it is clothed with oaks and brush, while luxuriant vineyards abound. Above the snow limit the mountain is bare and covered with fine limestone shingles. The summit is a plateau from which three knolls rise up, that on the w. being the lowest and that on the s.e. the highest. On the s. slope of the latter are the remains of a small temple described by St. Jerome. The view from Hermon is very extensive, embracing Lebanon and the plains e. of Damascus, to the n. and e., while to the s. there is an uninterrupted view of Palestine as far as Carmel and Tabor. On a clear day even Jaffa may be seen. Several small temples are found on the sides of Hermon, of which twelve in all have been explored. They face the e. and are dated by architects about 200 A.D. Foxes, wolves, and the Syrian bear are commonly found on Hermon, with various kinds of game.

HERMOPOLIS MAGNA (now Eshmoon or Ashmounen), a city of Heptanomis, or Middle Egypt, on the Nile. Owing to its frontier position with reference to Middle and Upper Egypt, the ancient Hermopolis was a place of importance, second only to Thebes. The portico, still remaining, of a magnificent temple has attracted the notice of travelers. It consists of twelve pillars each 40 ft. high, in two rows of six to each row, painted with bands of blue, red, and yellow. These pillars are composed of irregular masses fitted together—a peculiarity of extremely rare occurrence in Egyptian architecture. The ruins of Hermopolis have been greatly destroyed by the Mohammedans, who have used them for building purposes.

HERMOSIL'LO, a city in the n.w. of Mexico, in the state of Sonora, on a river of the same name, about 60 m. e. from the Californian gulf, and 90 n. of the port of Guaymas. The town lies in a valley, 10 m. long by 4 broad. The climate is dry and very hot, but the place is nevertheless considered healthy, being free from the epidemics which often accompany very high temperatures. The valley is very fertile, and produces grapes, melons, figs, oranges, limes, lemons, citron, peaches, and pomegranates in great abundance. The vine, however, is the principal object of cultivation, not less than 1500 barrels of brandy being annually made. The town has a large trade with Guaymas, being the principal entrepot for the trade with the interior. Pop. about 18,000, including about 3,000 Yaqui Indians, who are the laborers of the town.

HERNANDO, a co. in w. Florida, on the gulf of Mexico and the Withlacoochee river; 1950 sq.m.; pop. '70, 2,938—854 colored. It is level, and largely covered with forests. The soil is sandy. Chief productions: corn, cotton, sugar, rice, etc. Co. seat, Brooksville.

HERNDON, WILLIAM LEWIS, 1813–57; b. Va.; entered the navy at 15; served in the war with Mexico, and was for several years in the naval observatory. In 1851 he conducted an exploring expedition on the Amazon at the instance of the U.S. government, starting from Lima and crossing the Andes. In 1857 he was lost at sea while commanding the steamship *Central America* on her voyage from Havana to New York. Nearly all the women and children were saved, but Herndon and 426 others were lost.

HERNIA, in its widest sense, signifies a protrusion, through an abnormal or accidental opening, of any organ from its natural cavity. Although hernia may occur in many parts of the body, the word, used by itself, is restricted to signify protrusion of the abdominal viscera.

The way in which hernia may arise will be readily understood, if we bear in mind that the abdominal viscera are subject to violent pressure from the diaphragm and other surrounding muscles. This pressure forces them outwards and downwards against the walls of the belly; and if at any point these walls are not sufficiently strong to resist this pressure, some portion of the viscera is driven through them, and a hernial tumor is formed. Certain parts of the abdominal walls, especially the inguinal and crural rings, and the umbilicus, being weaker than others, hernia most frequently occurs at these points. In some instances hernia is congenital, as from abnormal deficiency of the walls; in other cases, it may arise at any period of life as a result of violent bodily exertion. Sex, age, and occupation seem to have a marked influence in predisposing to hernia. Men are far more liable (in about the proportion of four to one) to this disease than women; though they are less so to those forms of the affection known as femoral and umbilical hernia. According to Malgaigne, in France, one man in thirteen, and one woman in fifty-two, are the subjects of hernia. In respect of age, he found that the liability is least about the age of 13 (1 in 77), after which it progressively increases until the close of life, rising at 70–75 to 1 in 3.

A hernia is almost always composed of *a sac* and *its contents*. The sac is a portion of the peritoneum (q.v.) corresponding to the aperture at which the hernia protrudes. It is pushed forward by the protruding viscera, and forms a pouch. The contents vary greatly, but generally consist of a portion of the small intestine (particularly of the

ileum), forming the variety of hernia known as *enterocele*. Omentum is often found in hernial sacs, together with intestine. Besides the viscera, the sac always contains a certain quantity of fluid secreted by its interior. Hernia is divisible (1) into *reducible*, or returnable into the abdomen, *irreducible*, and *strangulated;* and (2) according to its situation, into *inguinal*, *crural*, etc.

The treatment of reducible hernia may be palliative or radical. The palliative treatment consists in the application of a truss (q.v.) to retain the protrusion within the cavity of the abdomen. Each particular kind of hernia (femoral, crural, etc.) requires its special form of truss; and before applying it, the hernia must be reduced by placing the patient on his back, relaxing the muscles by bending the thigh upon the abdomen, and pressing the tumor back in the proper direction. The truss should then be put on, and should be worn during the whole of the day; and if the patient will submit to wear it (or a lighter one) during the night, so much the better. The means that have been contrived to effect a radical cure are too purely surgical for description in these pages. Below the age of puberty, and if the hernia is recent, a radical cure is sometimes effected by wearing the truss for two or three years.

In irreducible hernia the protruded viscera cannot be returned into the abdomen, but there is no impediment to the passage of their contents or to their circulation. In these cases, the patient is often liable to dragging pains in the abdomen, and to attacks of vomiting, in consequence of the movements of the stomach being checked by the omentum or the intestines being fixed. There is also constant danger of this hernia passing into the strangulated form. The treatment may be either palliative or radical. The palliative treatment consists in the employment of a truss with a hollow pad that shall embrace the hernia and prevent any additional protrusion. A radical cure may *sometimes* be obtained by keeping the patient in the recumbent position, and on very low diet for two or three months; at the same time keeping the bowels open by laxatives and injections, and maintaining equable pressure over the tumor.

Hernia is said to be strangulated when a portion of intestine or omentum that is protruded is so tightly constricted that it not only cannot be returned into the abdomen, but has its circulation arrested. This form is highly dangerous, because, if relief is not speedily afforded, the strangulated part becomes gangrenous. The causes of strangulation are various, but this condition most commonly arises from a sudden violent effort, by which a fresh portion of intestine is driven into a pre-existing hernia, which it distends to such a degree as to produce this complication. The most prominent early symptoms are flatulence, colicky pains, etc. They are succeeded by vomiting first of the contents of the stomach, then of mucus and bile, and lastly of fæcal matters, owing to inverted peristaltic action. If relief is not obtained, the inflammation that commences in the sac extends to the peritoneum, and the ordinary signs of peritonitis appear. After a variable time comes gangrene or mortification of the part, and the patient speedily sinks.

The surgeon first tries to return the intestine, as in the preceding cases. This manipulation, termed the taxis, may be assisted by the internal use of chloroform, inhaled till it produces complete relaxation of the muscle, by general bleeding to the verge of faintness, by the hot bath, etc. If this fails, he must have recourse to the knife to divide the constriction.

HERNÖSAND, chief t. and seat of justice of Wester Norrland, on the e. coast of Sweden, built on the island of Hernö (connected with the mainland by bridges), about 3 m. s. of the mouth of the Angerman river, and 230 m. n. of Stockholm; pop. '76, 4,912. It is the seat of a bishop, and possesses a fine church erected in 1842–46. There are engine-works, timber-yards, saw-mills, and various manufactories in the town. The harbor is good. In 1878, 33 vessels, chiefly engaged in the timber trade, with a total burden of 7,698 tons, entered and cleared at the port. Tar is also exported, and there is an establishment for pisciculture in the town. Hernösand was founded in 1584, and received its town privileges from John III. in 1587.

HE'RO, a priestess of Venus, celebrated for her love for Leander. At a festival of Venus and Adonis, held at Sestos on the Thracian coast, Hero and Leander first saw each other, and were immediately inspired with a mutual passion. Hero's position as a priestess, and the will of her parents, opposed their union. Undaunted by these obstacles, Leander every night swam across the Hellespont to visit his beloved, who directed his course by holding a burning torch from the top of a tower on the sea-shore. After many interviews, Leander was drowned in a tempestuous night, and was cast on shore at the foot of the tower where Hero anxiously awaited him. At the sight of the body, she threw herself from the tower. A poem has come down to us under the name of Musæus, in which this story is sung; Schiller likewise has made it the subject of a beautiful ballad.

HERO, or HERON, commonly known as HERO OF ALEXANDRIA, was a pupil of Ctesibius, and flourished 284–221 B.C. He was a celebrated mathematician and natural philosopher, and displayed, especially in the latter subject, a most original and inventive genius. He constructed a great number of machines and automata—rather, however, as toys than for the purpose of applying them to any useful purpose—among which are *Hero's fountain* (q.v.); a *steam-engine* on the principle of Barker's mill (a vessel being caused to revolve by jets of steam issuing from lateral holes in the arms with which

it is provided); a double forcing-pump used for a *fire-engine* (q.v.), and various other similar applications of air and steam. It is but recently that the remarkable claims of Hero to such discoveries have received any notice, for in the valuable work of M. Dutens, entitled *L'origine des Découvertes attribuées aux Modernes*, the name of Hero is not even mentioned. Among his works which have come down to us are *Pneumatika*, his most valuable work, in which the above-mentioned machines and many others are figured and described; *Belopoietika* (on the manufacture of darts) and *Cheiroballistras Kataskeuē* (also on warlike instruments); *Peri Automatopoietikōn* (on the construction of automata). All these works are merely fragments, and an acquaintance with them causes us to regard with the greater regret the loss of the rest. The best edition of his works is that published in the *Veterum Mathematicorum Opera* (Paris, 1693).

HER'OD, the name of a family which rose to power in Judea during the period which immediately preceded the complete destruction of the Jewish nationality. The family was of Idumean descent; but, though alien in blood, was Jewish in religion, the Idumeans having been conquered and converted to Judaism by John Hyrcanus, 130 B.C. The most remarkable rulers of the name are four in number—Herod the great, Herod Antipas, and Herod Agrippa I. and II. (for the last two, see AGRIPPA). 1. HEROD THE GREAT. He was the second son of Antipater, who was appointed procurator of Judea by Julius Cæsar, 47 B.C. At the time of his father's elevation, Herod, though only 15 years of age, was made governor of Galilee, and afterwards of Cœle-Syria; and finally he and his elder brother were made joint-tetrarchs of Judea; but he was soon displaced by Antigonus, the representative of the Asmonean dynasty, and forced to flee to Rome, where he obtained, through the patronage of Antony, a full recognition of his claims, together with the title of king of Judea, 40 B.C. Several years elapsed, however, before he succeeded in establishing himself in Jerusalem. On the fall of Antony, he managed to secure a continuance of favor from Augustus, from whom he not only obtained a confirmation of his title to the kingdom, but also a considerable accession of territory, 31 B.C. From this time till his death, his reign was undisturbed by foreign war; but it was stained with cruelties and atrocities of a character almost without parallel in history. Every member of the Asmonean family, and even those of his own blood, fell in succession a sacrifice to his jealous fears; and in the latter years of his life, the lightest shade of suspicion sufficed as the ground for his wholesale butcheries, which are related in detail by Josephus. Of these, the one with which we are best acquainted is the slaughter of the infants at Bethlehem. The one eminent quality by which Herod was distinguished was his love of magnificence in architecture, and the grandeur of the public works executed under his direction. Even by these, however, he alienated the Jews, who ascribed them all to his gentile leanings, and to a covert design of subverting the national religion. Herod married no fewer than ten wives, by whom he had fourteen children. He died of a loathsome disease at the age of 70, after a reign of 37 years.—2. HEROD ANTIPAS, son of Herod the great by his wife Malthace, a Samaritan, was originally designed by his father as his successor; but by the final arrangements of the will of Herod the great, Antipas was named tetrarch of Galilee and Perea. He divorced his first wife, the daughter of Aretas, king of Arabia Petrea, in order to marry Herodias, the wife of his half-brother Philip—an incestuous connection, against which John the baptist remonstrated, and was in consequence put to death. It was during a visit of Herod Antipas to Jerusalem for the purpose of celebrating the passover that our Lord, as having been a resident of his tetrarchate, was sent before him by Pilate for examination. At a later time he made a journey to Rome, in the hope of obtaining the title of king; but he not only failed in this design, but, through the intrigues of Herod Agrippa, was banished to Lugdunum (Lyon), where he died in exile.

HERO'DES ATTICUS. See ATTICUS HERODES.

HERODIAN, author of a Greek history extending from 180 to 238 A.D. It narrates the events of the 58 years that intervened between the death of Marcus Aurelius and the proclamation of Gordianus III. The narrative is of special value for the reigns of the emperors subsequent to Alexander Severus, with whom the work of Dion Cassius ends. As a historian, Herodian has prominent merits and defects. His work has the value that attaches to a record written by one chronicling the events of his own times, gifted with respectable powers of observation, indubitable candor, and independence of view. But he prefers style to truth, and is thus led into exaggerations and errors. The inner life and thought of Rome, the formidable barbarian pressure on her borders, are alike unheeded, that he may blazon his pages with the dazzling vicissitudes of the purple. Though the declamations which he introduces are apt to become tedious, his story is on the whole clear, graceful, and vivacious. The frequent antitheses and studied tricks of phrase savor of the rhetorical schools. Imitations of Thucydides and Latinisms are frequent. Yet in the main his style retains an original cast, a genuine unborrowed beauty, and contrasts favorably with the thin, affected Atticism of the period.

HERODIANS, a sect among the Jews, as to whose particular tenets there have been many opinions. Probably they were political in aim, and supported Herod Antipas in his claims to regal power. In New Testament history we generally find them opposed to the Pharisees, or hierarchical party.

HEROD'OTUS, the oldest Greek historian, and for this reason usually styled the "father of history," was b. at Halicarnassus, in Caria, 484 B.C. He appears to have early formed the resolution of writing a historical work on an extensive scale, and with this view determined to visit and observe with his own eyes the most remote countries and nations. Although the dates and extent of his travels are involved in obscurity, and sometimes even in contradictions in the ancient narratives, we gather from his own statements that in his early youth he visited the islands and coasts of Asia Minor; that subsequently he devoted particular attention to Egypt, which was at that time little known; that he next visited Palestine and Phenicia; and finally penetrated as far east as Babylon and Susa. We are also informed that he sailed through the Hellespont into the Black sea, and visited all the countries situated on its shores. After his return, he appears to have resided for a time at Athens. He speaks of having seen the *propylæa*, i.e., the entrances to the Acropolis, which were not finished till the outbreak of the Peloponnesian war (431 B.C.). He also interested himself warmly in the politics of his native city, was instrumental in delivering it from the tyranny of Lygdamis, a vassal of Persia; but being what we should call "a moderate liberal," he had the misfortune to offend the extreme or popular party, and in consequence withdrew to Thurii, in Italy, whither many of his fellow-citizens had previously proceeded. Here, in all probability, he wrote his immortal work in the decline of his life. Lucian, an indifferent authority on such a subject, states that about the year 456 B.C. he read the nine books before the Greeks assembled at the Olympic games, but this is contradicted by the numerous allusions in the history to incidents of later occurrence—for example, the revolt of the Medes against Darius Nothus (409–408 B.C.). The statement of Pliny that it was composed in his old age at Thurii is the most probable, and it best agrees with the unfinished programme of the work, and its abrupt termination, as if the author were prevented by death from finishing it as he intended. According to Suidas, he died and was buried at Thurii about 408 B.C.

The purpose of Herodotus in his history is to describe the war between the Persians and the Greeks—the struggle for supremacy between Europe and Asia, between civilization and barbarism, between freedom and despotism. Herodotus, wishing to indicate that the antipathy between the two was not the result of any accidental quarrel, but of a deep-rooted difference of character, traces it back to the mythical ages. This was the only way in which a man in his time could express what we mean when we speak of the differences of *race*. In the course of his history, he gives an account of the various countries which he had visited. Wherever he gives the results of his own observations and inquiries, he exhibits a wonderful accuracy and impartiality; and when he does not do this, he is generally careful to say so. He has been accused of credulity, and it is certain that he too readily accepted statements on the authority of others, but that he was personally a keen intelligent observer of what he saw is beyond all dispute. Herodotus wrote in the Ionic dialect, but Attic, Doric, and epic forms occur in his work. The style is marked by an easy grace and lively vigor, and everywhere there is the presence of a reverent spirit, giving a certain air of moral dignity to the entire composition. The first edition (in Latin), by Laurentius Valla, appeared at Venice in 1474; the first in the original Greek at Venice in 1502. The chief modern editions are those of Schweighauser (6 vols., Strasb. and Paris, 1806), Gaisford (4 vols., Oxford, 1824), Bähr (Leip. 1830–34), and Müller (Paris, 1844). The best school editions are those of Matthiæ (2 vols., Leip. 1825), Bekker (Berlin, 1833 and 1845), G. Long (Lond. 1830), and Negris (Edin. 1834). A variety of translations of the writings of Herodotus have likewise been published, as well as of historical and geographical treatises calculated to facilitate the study of the celebrated historian.

HEROES were, in the Homeric period, the kings, princes, generals, leaders, all brave warriors, and men who excelled in strength, courage, wisdom, and experience. Many of these had, on account of such qualities, a fabled origin, half human, half divine, and were honored, after their death, with a kind of adoration or inferior worship. These heroes and demigods were recognized as the special patrons or protectors of particular countries and cities, and to them were raised temples and altars. These examples of heroic character, held up constantly to the admiration and imitation of peoples, tended to strengthen their peculiar character, and to impress them with the greatness and glory of courage, contempt of danger, and nobility of purpose. Poetry exalted the heroic sentiment to sublimity; and poems which celebrated the deeds of heroes are themselves termed heroic. The imaginary time when heroes and other semi-divine beings lived on earth was called the HEROIC AGE. See AGES.

HEROIC VERSE. See METER, VERSE.

HEROLD, LOUIS JOSEPH FERDINAND; 1791–1833; b. France; a composer who studied with Adam and Cherubini, and successfully competed for the conservatory prizes. He spent five years in Italy, and upon his return composed several successful but ephemeral pieces for the opéra comique. *Zampa* is his best-known production. It was followed by the *Pré au Clercs*, also much admired. His health was seriously affected by the assiduity of his studies, and he died in the prime of life.

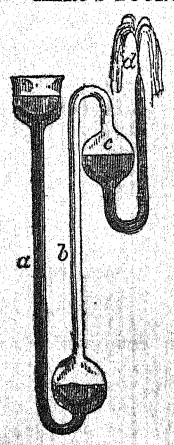
HERON, *Ardea*, a genus of birds, of the order *grallatores*, tribe *cultrirostres*, and family *ardeidæ*. This family includes also bitterns, night-herons, spoonbills, boatbills,

storks, adjutants, ibises, etc. The bill is long, compressed, and sharp; the tail short; the legs and the toes long and slender; the wings long. In the herons—in which genus are included the species commonly designated egrets (q.v.), which differ only in unimportant particulars of plumage—the bill is slender but strong, forming a compressed and lengthened cone; the plumage is beautiful, but seldom exhibits very gay colors; white, brown, black, and slate color, finely blended, being generally predominant. The body is small in proportion to the length of the neck and limbs; the neck is long, and, except in flight, is usually held curved. In flight, the heron carries the neck, head, and long bill in a straight line before the body, and the long legs in like manner stretched out behind. Herons feed mostly on fish, frogs, and other aquatic animals; and may be seen, particularly very early in the morning and late in the evening, standing patiently motionless in some shallow water, at the margin of a lake or stream, or on the sea-shore, waiting till prey come within reach. In default of their more common food, however, herons sometimes prey on young birds, reptiles, and the smaller mammalia. They usually go forth singly in quest of prey, but are mostly gregarious in their nidification. —The COMMON HERON (*A. cinerea*) is about 3 ft. in length from the point of the bill to the end of the tail. It is of a delicate gray color on the upper parts, except the quill-feathers, which are black, and the tail, which is deep slate color. The common heron generally builds its nest in a high tree, and many nests are sometimes to be seen in a single tree. Pennant tells us that he counted 80 in one oak in Lincolnshire. In very northern parts of the world, the heron is known only as a summer bird-of-passage, but it remains in Britain all the year. Its geographical range extends over most parts of Europe and Asia, and includes the north of Africa. The heron was formerly in great esteem for the table, although now disregarded; it was also the kind of game most of all pursued in falconry; and the English act, 19 Henry VII. c. 11, prohibited the killing or taking of herons, except by hawking or with the long-bow. This act was not repealed till the game act of Geo. IV.—The PURPLE HERON (*A. purpurea*) is a smaller and much rarer British species.—The GREAT WHITE HERON, or GREAT EGRET (*A. alba*), a mere accidental visitor of Britain and of the western parts of Europe, is more common in Turkey, Greece, etc., and in some parts of Asia. It is an extremely beautiful bird, with perfectly white plumage, much of it loose and flowing.—The LITTLE EGRET (*A. garzetta*) has also white flowing plumage. It is only about 2 ft. in length.—America has many species of heron, most numerous in its warmer regions. The most common species in the temperate parts of North America is the GREEN HERON (*A. virescens*), the flesh of which is so much esteemed that it is often to be seen in the markets.

Heron and egret plumes, made of the long feathers, were in former times highly valued, being, in some countries, deemed an ornament fit for royal personages or for the highest nobles.

HEROPH'ILUS, one of the greatest physicians of antiquity, was b. at Chalcedon, in Bithynia, and flourished in the 4th and 3d centuries B.C. He settled at Alexandria, and distinguished himself in particular by his devotion to anatomy. In fact, he is said to have pursued this to such an extent as to have dissected criminals alive. Several names which he gave to different parts of the body are still in use, as the "torcular herophili," the "calamus scriptorius," and the "duodenum." Herophilus placed the seat of the soul in the ventricles of the brain. Of his writings only a few fragments remain, which have been collected and published in a dissertation entitled *De Herophili Celeberrimi Medici Vita, scriptis, atque in Medicina Meritis* (Gött. 1840).

HERO'S FOUNTAIN, a pneumatic apparatus, through which a jet of water is supported by condensed air. A simple mode of constructing it by means of glass tubes and a glass-blower's lamp is shown in the annexed figure. The column of water in the tube *a* compresses the air in *b;* this presses on the surface of the water in *c*, and causes it to gush out at *d*.



HEROS'TRATUS, an Ephesian, who, from a desire of future fame, set fire to the magnificent temple of Diana, in 356 B.C. He expiated the deed by a painful death; and, by a decree of the Ionians, capital punishment was to be inflicted upon any one who should mention his name; a decree which produced an effect directly the reverse of what had been intended. The temple is said to have been set on fire on the night that Alexander the great was born.

HER'PES, a variety of disease of the skin, characterized by vesicles, sometimes as large as a split-pea, occurring in clusters on an inflamed base, and ending in desquamation, after a course of a few days or weeks. In herpes zoster, or zona, the largest and most marked variety of the disease, there is the additional peculiarity that it extends in patches around one side of the body, usually passing sharply up to the middle line, but not beyond it either before or behind. Herpes phlyctænodes, zoster, labialis, preputialis, circinatus, are the varieties of this disease most commonly met with in practice. The treatment is by soothing and cooling applications; there is no danger; but the smarting during the eruptive period, and the itching afterwards, are often very

distressing to the patient, and may be somewhat relieved by the application of cold cream and other simple soothing external applications.

HERPETOLOGY (Gr. *herpĕton*, a reptile, and *logos*, a discourse), that branch of natural history which treats of reptiles. The batrachians or amphibia having, till recently, been included by naturalists generally—as they still are by many—in the class of reptiles, the science of herpetology may be regarded as including the study of them. This branch of natural history received a share of attention from the naturalists of antiquity and the earlier naturalists of modern times. The name most deserving of notice in connection with it before the time of Linnæus is that of Ray. In the end of the 18th c. and beginning of the 19th, herpetology received special attention from Lacépède, Brongniart, Latreille, and Daudin, all of whom, as well as Cuvier, contributed greatly to its progress. More recently, it has been much advanced by the labors of Schlegel, Fitzinger, J. E. Gray, Müller, Owen, etc. The work of Spix on the *Reptiles of Brazil* is one of the most important contributions to herpetology. Bell's *History of British Reptiles* (Lond. 1839) contains a very full account of all the British species, including the batrachians. This branch of natural history derives great additional interest from the numerous fossil remains of reptiles of former geological periods, and from the great size and extraordinary characters of many of them.

HERPETOLOGY (*ante*). See BATRACHIA and REPTILES, *ante*.

HERPETON TENTACULATUS, a snake found in tropical regions which has scale-covered appendages attached to the mouth, the uses of which are at present unknown.

HERRERA, ANTONIO, one of the most eminent historians of Spain, was b. at Cuellar, in the year 1549, and died at Madrid, 1625. His principal work is the *Historia general de los Hechos de los Castellanos en las Islas y Tierra Firme del Mar Oceano*, 1492–1554 (1601–15), which was afterwards published with continuations by Andr. Gonzalez de Barcia (1728–30). His *Descripcion de las Indias occidentales* (1601 and 1615) forms an introduction to the above work. His other works are the *Historia del Mundo en el Reynado del Rey D. Felipe II.* (1601–12); *Commentarios de los Hechos de los Españoles, Franceses y Venecianos en Italia*, 1281–1559 (1624); and the *Historia de Portugal y Conquista de las Islas de los Açores*, 1582 *y* 1583 (1591).

HERRERA, FERNANDO DE, a Spanish poet, was b. at Seville in the beginning of the 16th century. When advanced in life he took orders, and died in 1589. He was master of the Greek, Roman, and Italian literatures, and was a man of prodigious learning. As a poet, he ranked so high in the opinion of his contemporaries that they bestowed upon him the appellation of the *divine*. Many of his erotic poems are remarkable for tender feeling; while his odes frequently display a lofty enthusiasm, but the expression is cast in too classical a mold, and consequently wears a certain air of artificiality. His *Obras en Verso* (1582) were republished in the *Coleccion* of Ramon Fernandez (1786; new edit. 1808). His chief historical work is the *Relacion de la Guerra de Chipre* (1572); and he translated from the Latin of Stapleton a life of Sir T. More.

HERRERA, FRANCESCO, EL VIEJO, i.e., the elder, one of the most eminent Spanish painters of the school of Seville, was b. in that city about the year 1576. His drawing was bold and spirited; for which reason he may justly be regarded as the founder of a new and more national school. His "Last Judgment" is a masterpiece of drawing and coloring; and his "Holy Family" and "Outpouring of the Holy Spirit" are also much esteemed. The cupola of the church at Sta. Bonaventura displays his skill in fresco-painting. He died at Madrid in 1656. Some of his best works are in the Louvre at Paris.—His youngest son, FRANCESCO HERRERA, EL MOZO (the younger), was born at Seville in 1622. He studied under his father, and afterwards went to Rome, where he became so celebrated for his fish-pieces that he received the surname of *Il Spagnuolo degli Pesci*. After his father's death he returned to Spain, where he painted church-pictures, domes, etc. He died at Madrid in 1685.—There have been several other artists of the same name, but of less note.

HERRICK, ROBERT, b. at London in 1591, was educated at Cambridge, and in 1629 presented to the vicarage of Dean Prior, Devonshire. Ejected from his parish by the Long parliament in 1648, he repaired to London, and published two volumes of poems, *Hesperides* and *Noble Numbers*. On the restoration of Charles II. he was reinstated in his old living, where he died in 1674. His poems, which are all lyrical, are graceful and melodious, and show much fine fancy. They vary in subject from amatory verses, sometimes indelicately expressed, to pieces of deep religious feeling. Such songs as *Cherry Ripe*, and *Gather the Rosebuds while ye may*, are universally known. The most complete edition of his works is that by the rev. A. B. Grosart (London, 1876).

HERRING (*Clupea harengus*), a fish of the malacopterous family *Clupeidæ* (q.v.); the most important to mankind of all species of fish. The genus *Clupea* is distinguished from others of the same family chiefly by the fins and by the teeth, which are small and numerous, and are situated not only on the jaws, but in other parts of the mouth, as the *vomer* (middle line of the palate) and the tongue. The herring, of which we think it unnecessary to give any description, is found in the seas of the northern parts of the world, but more abundantly in those of temperate than of arctic regions. The opinion

once entertained that its proper home is within the Arctic circle, and that its vast shoals issue thence at certain seasons, migrating southward, and spreading themselves along the British and other coasts, is now discarded as utterly without foundation; and the herring is believed to be an inhabitant of deep water, from which, at certain seasons, it approaches the shores, probably never migrating to any great distance. The young are abundant in the shallow water near the shores at seasons when the parent fish are absent. The herring seems always to deposit its spawn in comparatively shallow water, and is said to be very indifferent whether the spawning-ground be sandy, rocky, or covered with submarine vegetation. Certain localities, however, have the reputation of being favorite spawning-grounds. When the great annual shoals of herrings appear on the coasts, they generally swim near the surface of the water, and are followed by multitudes of larger fishes, as hakes, dog-fishes, etc., which prey on them; great numbers also fall a ready prey to gulls and other sea-birds, which congregate for the occasion. The food of the herring is believed to consist chiefly of minute crustaceans and *acalephæ;* but it feeds also on small fishes, not scrupling to devour even the young of its own species. Herrings are sometimes, though rarely, caught on the lines set for other fishes, and by persons angling from the shore; they are readily caught by means of a lure made of a white feather, which swims at the depth of some yards, the point of the fishing-rod being kept a yard or two below the surface of the water, the angler being in a boat which is in motion. The immense multitudes of herrings annually taken by the net cause no apparent diminution of their abundance, the destruction being compensated for by prodigious fecundity; more than 68,000 eggs have been counted in the roe of a single female. But herrings, without any apparent cause, often desert parts of the coast where for a time they have been remarkably abundant, not returning again in similar plenty till after the lapse of a number of years. Some instances of this kind, in the western parts of Scotland, were popularly ascribed to steamboats, when these first began to ply. The magnitude of the shoals of herrings is often enormous, and they have sometimes even been driven ashore in far greater quantities than the inhabitants of the neighborhood could find means of curing. An instance of this kind occurred, before the days of railways, at Crail in Fife. The water, as the tide came in, was so full of herrings, that half a dozen could be taken out at one dip of a basket. Finally, they were stranded and left by the retiring tide in such numbers, that when all the salt within reach was exhausted, the magistrates had to offer a shilling a cart for their removal as a nuisance.

There is evidence that the herring-fishery has been prosecuted in England since the beginning of the 8th c., and in Normandy since the 11th. Nor is it probable that in either case the date is that of its commencement. The prosperity of Holland is in a great measure owing to the herring-fishery, and the Dutch engaged in it with great eagerness, and carried it on even on the British coasts, at a time when it was comparatively neglected both by English and Scotch.

Another species of herring (*C. leachii*) is occasionally found on the British coasts. It is rather smaller than the common herring, and the body is much deeper in proportion to its length. It is of particularly delicate flavor. The seas of other parts of the world produce a number of other species of the genus *clupea*, as now restricted by ichthyologists. The other British *clupeidæ* are now referred to other genera.

The fishes popularly called *freshwater herrings* are *salmonidæ* of the genus *coregonus* (q.v.), to which also belong the *herring salmons* of the North American lakes and rivers. All of them are esteemed for the table.

HERRING, Vancouver Island (*Meletta cærulea*), a fish of the same family with the herring, and much resembling it both in appearance and otherwise. The genus *meletta* differs from *clupea*, to which the herring belongs, chiefly in having no teeth, except that name may be given to a rough band on the tongue. The Vancouver Island herring abounds on the north-western coast of North America. It is generally about 10 in. in length. Its color is bright steel blue, shading away on the sides to brilliant silvery white, the fins yellowish white. Immense shoals of these herrings appear on the coast at different seasons from Feb. to July; often pursued by dog-fish, so that fleeing from the enemy, they even rush upon the shore, where great numbers die among the pebbles. They afford a chief part of the sea-harvest of the Indians, who take them by various means—by the rake, such as is used by the candle-fish (q.v.), for the shoals often so fill the water that it may be employed; by hand-nets; and by long dams of lattice-work, along the outside of great mud-flats left dry by the retiring tide. The spawn of this fish is also a favorite article of food of the Indians, and is obtained by placing great quantities of fir branches in the mud over the flats, within the dams used for catching the herring. The spawn gets entangled among the branches, and is removed to be dried in the sun. Great numbers of the herring caught by the Indians are used only for the extraction of the oil. The Vancouver Island herring seems likely to acquire a great commercial importance.

HERRING, John Frederick, 1795–1865; b. England, the son of an American. The boy had a passion for painting horses, and for many years executed the portraits of the winners of races. He was a great expert in drawing other animals, fowls, etc. One of

his best known works is "Three Members of the Temperance Society," representing three horses drinking at a fountain.

HERRING-FISHERY. The herring-fishery is carried on all the year round, there being both a winter and a summer fishery; but the largest quantities of fish are caught in the months of Aug. and Sept., at which time the fishery becomes general on all parts of the British coasts.

The common mode of capturing herrings is by a set of large nets joined together, and known among fishermen as a "drift." These nets, held together by a back-rope, are let into the water in a straight line, and are kept perpendicular by a number of bladders or cork floats, balanced by a few slight weights of lead. Each single net is composed of fine twine worked into meshes of an inch square, and is 50 yds. long and 33 ft. in depth. These nets, which are now woven by machinery, were formerly made by the fishermen's families; but so many are used now, that it would be impossible to make them by hand, as each boat has a train that extends nearly a mile in length.

The herring-fishery in Scotland is regulated by acts of parliament, and watched over by the commissioners for the British fisheries. This board will allow of no other method of taking the fish than by a drift-net. Another mode of fishing, known as "trawling," but which is in reality carried on by means of a "seine"-net, prevails on some parts of the British coast; but in Scotland trawling is illegal, and subjects those who practice it to heavy penalties. The boats required in the herring-fishery in Scotland, although open or undecked, require to be of considerable size, in order to contain the large quantity of nets which are used, as well as to bring home the fish that may be taken; the fishermen also believe that the open boats are more convenient for the manipulation of the nets. Most of the boats used in Scotland are obtained from the port of Leith, which has long been celebrated for the build of its open fishing-boats. Each vessel is manned by a crew of five or six persons, one to guide the boat, and the others to maneuver the sails, nets, etc. The boat usually belongs to one person, who hires his assistants, or, as in some cases, may be owned by two or three relatives, who form themselves into a crew, and share in the proceeds of the capture. The boats of a district usually gather to a particular center, for the convenience of the curers. Some fishermen will proceed a hundred miles or more to a favorite port, and many of the curers have curing-stations at five or six different places. The boats proceed to sea so as to arrive at the place selected for casting the nets about sunset, when the sail is struck, and the nets are gently paid over the boat, which requires to be kept in motion during the process. The last portion of the nets is fixed to the boat by a long swing-rope, and when the whole train has been let into the sea, the fishermen go to rest; the boats and nets being allowed to drift with the tide. The herrings are caught by striking against the nets, in which they entangle themselves by the head. The herring-fishery partakes greatly of the nature of a lottery. A boat will sometimes obtain a large quantity of herrings, and as frequently take only a few; sometimes the nets are shot twice in a night, if no fish are got on the first trial.

The commerce carried on in herrings is peculiar. The fish when brought on shore are measured ungutted by the "cran," a vessel which contains 45 gallons, and handed over to the curer. A very large proportion of the herrings taken on the British coast are pickled or cured by means of salt; owing to the facilities for speedy transport afforded by railways, however, great quantities are also disposed of fresh. At Yarmouth, and some other parts of England, and also at some places in Scotland, the herrings are, after being slightly salted, made into what are called "bloaters," by means of smoking. A large portion of the total catch is likewise made into "reds" by a more complete smoking, and both kinds are in great demand. Smoking-houses are now numerous in many parts of Scotland.

The chief buyers of the fresh fish are known as curers; they provide salt, barrels, and labor for the curing and packing of the fish. The curer, who is usually a person of considerable capital, contracts with the owners of the boats for a certain quantity of fish, usually 200 crans, for which he pays at a rate which has been arranged for long before the commencement of the fishery. In addition to a specified price per cran, a sum of money is usually paid down by way of bounty, and various privileges, such as dye-stuffs and drying-ground for nets, a few gallons of whisky, etc., are agreed for as well. Some curers will have as many as 250 boats fishing for them on various parts of the coast. The herrings are cured (in Scotland) under the inspection of an officer, and each barrel, if cured according to the instructions laid down by the fishery board, is entitled, on the payment of a small fee, to be marked with the government brand, as a mark of its quality. A large number of women are employed to gut and pack the fish, which they do with astonishing dexterity. The excitement and bustle at a large fishing-port during the herring season are remarkable, large numbers of people being employed in the various industries incidental to the capture and cure of the herrings. Amsterdam is said to have been built on herring-bones; but the Dutch herring-fishery, once of great magnitude, has been exceeded by that of Scotland, which is the largest in the world, and from which cured herrings are exported to the continent of Europe and to Ireland, and other countries, in large quantities. The only official statistics of the herring-fishery in Great Britain relate to the fishery in Scotland

and the Isle of Man; these are issued annually by the commissioners of the British fisheries. No account is kept of the quantity of herrings caught on the English coast, nor is there any authentic statistics of the number or value of the boats engaged in this branch of the fishery.

From the report of the Scottish fishery board for 1876, it appears that, in that year, there were 90,713 persons and 14,547 boats (of which, with nets, etc., the value was £1,127,994) employed in the Scottish herring and other fisheries. The total quantity of herrings cured in this year, which was the most unproductive since 1859, was only 598,197; whereas in 1875, 942,980 barrels were cured. In 1877 again the number of barrels was 847,718. The Irish reports give no such statistics, and details of the English herring-fishery cannot be separated from those of other branches of the fishery business.

Herring-fisheries have always been the subject of legislative protection in the United Kingdom, being considered a valuable branch of public industry. In 1860 an act of parliament, 23 and 24 Vict. c. 92, passed to regulate the Scotch herring-fisheries. By that act, the commissioners of the British white-herring fishery may appoint a close season in some parts of the Scotch coast, there being a close season also fixed from Jan. to May inclusive, as to the principal parts of the coast. The kind of fishing-boats and nets employed in the fishery is subjected to regulation. A penalty is incurred by selling fresh herrings during close time, 24 and 25 Vict. c. 72. The following are the more recent acts for the encouragement and regulation of the British white-herring fishery: 48 Geo. III. c. 110, 51 Geo. III. c. 101, 52 Geo. III. c. 153, 54 Geo. III. c. 102, 55 Geo. III. c. 94, 1 Geo. IV. c. 103, 1 and 2 Geo. IV. c. 79, 5 Geo. IV. c. 64, 7 Geo. IV. c. 34, 1 Will. IV. c. 54, 6 and 7 Vict. c. 79, 10 and 11 Vict. c. 91, 14 and 15 Vict. c. 26, 23 and 24 Vict. c. 92, 24 and 25 Vict. c. 72, 37 and 38 Vict. c. 25. See FISHERIES.

HERRING FISHERY (*ante*) in America is an industry of great importance, rivaled in value only by the cod and seal fisheries. From seven and a half to ten millions of pounds, valued at from $200,000 to $300,000, are brought into market in the United States, besides immense quantities consumed while fresh. The chief fishing port is Gloucester, Mass., although other ports do a large business. The vessels go northward to the coast of Maine, Nova Scotia, New Brunswick, the Magdalen island, Newfoundland, and Labrador, in spring and early winter. In winter the fish are frozen and sent in that condition to market. This fishery is of great importance to the Eastern states and the Dominion of Canada, and the herring as well as the cod was among the subjects that brought about the British-American fishery commission of 1877.

HERRING SILVER, a composition in money, in lieu of supplying a religious house with a certain number of herrings.

HERRISON (Fr. *hérisson*), in heraldry, the hedgehog, a charge allusively borne by families of the name of Harris.

HERRNHUT, a small t. in the circle of Bautzen, kingdom of Saxony, about 50 m. e. of Dresden. It is pleasantly situated on the southern slope of the Hutberg, from which it takes its name, and is noted throughout Germany for its fine and durable manufactures, particularly linen, japanned wares, and leather. Herrnhut is also remarkable for the regularity and simplicity of its architecture, and the inhabitants for their cleanliness, freedom from all ostentation, and quiet deportment. Pop. about 1200. Herrnhut was founded in 1722 by a colony of persecuted Moravians, some of whom were descended from the old Bohemian and Moravian brethren. On coming into Saxony they were sheltered and protected by the pious count Zinzendorf, to whom Herrnhut belonged. From this place the united brethren, better known as Moravians, have spread themselves over all parts of the world.

HERRON, FRANCIS JAY, b. Penn. 1837; graduated at the Western university; entered the union army as captain in 1861, and was engaged in several battles, and seriously wounded at Pea Ridge. In May he received the surrender of the confederate forces west of the Mississippi. In 1872 he was secretary of the state of Louisiana.

HERSCHEL, CAROLINE LUCRETIA, sister of the astronomer, sir William Herschel (q.v.), b. Mar., 1750, lived in Hanover till 1772, when she came to England to live with her brother at Bath. When William turned astronomer, she became his constant helper; and on his being appointed private astronomer to George III., she acted as his assistant, doing all the duties of an assistant astronomer, and in that character receiving a small salary from the king. While discharging her duties in this position, she found time for a series of independent observations with a small Newtonian telescope, made for her by her brother. Her special business was to sweep the heavens for comets, seven of which she discovered, in regard to five of which she has the credit of priority of discovery; and several remarkable nebulæ and clusters of stars included in William's catalogues were described from her original observations. In 1798 she published, with an introduction by her brother, *A Catalogue of Stars taken from Mr. Flamsteed's Observations*, etc. This valuable work was published at the expense of the royal society, and contained 561 stars omitted in the British catalogue. She lived with her brother during the whole of his career, sharing his labors and distinctions, and on his death returned to her native country. She was then 72 years of age, but she lived to be 98, retaining all

her faculties to the last. In her last days, she was not idle. In 1828 the royal society conferred on her their gold medal for completing the catalogue of nebulæ and clusters of stars observed by her brother. She was afterwards chosen an honorary member of the royal society. Miss Herschel died in 1848, after an uncommonly long and useful life. See her *Memoir and Correspondence* (1876).

HERSCHEL, Sir JOHN FREDERICK WILLIAM, BART., only son of the astronomer, sir William Herschel (q.v.), b. at Slough, 1792, educated at St. John's, Cambridge, where, in 1813, he became senior wrangler and first Smith's prizeman. His first publication was *A Collection of Examples of the Application of the Calculus of Finite Differences* (1820). In 1822 he applied himself especially to astronomy, using his father's methods and instruments in observing the heavens. For a time he worked with sir James South in re-examining the nebulæ and clusters of stars described in his father's catalogues. The results of the re-examination were given in 1833 to the royal society in the form of a catalogue of stars in order of their right ascension. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father, and on a great number of double stars—in all between 3,000 and 4,000. This important contribution to science led to his being acknowledged as the worthy successor of his father; so early, indeed, as 1826, the royal society had voted to him and South a gold medal apiece for their observations on double stars; but by 1833 his pre-eminence was beyond the necessity of being marked by acknowledgments. His "Treatise on Sound" had appeared in the *Ency. Metro.* in 1830, and his "Treatise on the Theory of Light" (in the same work) in 1831, in which year also appeared in Lardner's *Cyclo.* his well-known "Preliminary Discourse on the Study of Natural Philosophy"—not to mention his papers in the *Trans. Astron. Soc.* The Preliminary Discourse—one of the most charmingly written books on science in any language—contributed largely to his popularity. In 1836 appeared his "Treatise on Astronomy" in Lardner's *Cyclo.* At this time Herschel was at the cape of Good Hope, where he arrived in Jan., 1834, with the intention of completing the survey of the sidereal heavens, by examining the southern hemisphere as he had done the northern. Here he established his observatory at a place called Feldhausen, 6 m. from Table bay. On Mar. 5, 1834, he commenced his observations; and in four years, working all the time at his own expense, he completed them. The public interest taken in his labors was, as might be supposed, very great; but though now and then gratified by partial statements of his results, it was not till 1847, nine years after his return from the cape, that it received full gratification in the publication of a volume of *Results of Astronomical Observations made during* 1834–38 *at the Cape of Good Hope; being the Completion of a Telescopic Survey of the whole Surface of the Visible Heavens, commenced in* 1825. It need not be said that the results of these labors are invaluable. They are now incorporated into all books on astronomy. Herschel, when at the cape, gave an impulse to the science of meteorology, having the merit of having suggested the scheme for taking meteorological observations simultaneously at different places. In 1844 he published, under official military authority, a book of instructions for taking and recording such observations in southern Africa.

On his return to England in 1838, honors were showered on him. He had got the royal society's gold medal in 1836: he now was made a D.C.L. of Oxford; on queen Victoria's coronation, he was created a baronet; he now succeeded the duke of Sussex as president of the royal society; in 1848 he became president of the royal astronomical society. In 1849 he published his *Outlines of Astronomy.* In 1850 he was appointed master of the mint. This office, on account of ill health, he resigned in 1855. Herschel died May 11, 1871, and after his death appeared his *Catalogue of* 10,300 *Multiple and Double Stars.*

HERSCHEL, Sir WILLIAM, b. at Hanover, Nov. 15, 1738, was the son of a musician and was educated specially as a professional musician. In 1757 he went to England, where he became a teacher of music in the town of Leeds, from which he went to Halifax as organist, and subsequently (1766) in the same capacity to Bath. Here he would seem to have first turned his attention to astronomy. Wanting a telescope, and unable to afford a reflector, he made one for himself—a Newtonian, of 5 ft. focal length, and with this applied himself to study the heavens. In 1781, he made his first discovery (*Philos. Trans.* 1780–81), being a new planet, which at first he took for a comet. It was detected by an exhaustive process of surveying the heavens, which Herschel was the first to follow, taking the stars in regular series, and examining them all in their groups through the same instrument. The result of his discovery was his appointment to be private astronomer to George III., with a salary of £400 a year. He then went to live at Slough, near Windsor, where, assisted by his sister Caroline (q.v.), he continued his researches. Herschel married a Mrs. Mary Pitt, and left one son, John (q.v.). Little is known of his private life. He was knighted by George III., and made a D.C.L. by the university of Oxford; he became rich partly through his wife's jointure, and partly through selling mirrors for reflecting telescopes. He died at Slough, Aug. 23, 1822.

Herschel contributed 69 papers to the *Philos. Trans.* between the years 1780 and 1815; and to the 1st vol. of *Mem. of Astron. Society,* he contributed a paper, "On the Places of 145 New Double Stars." He greatly added to our knowledge of the solar

system: he discovered Uranus and its six satellites, and two satellites of Saturn. Besides this, he detected the rotation of Saturn's ring, the period of rotation of Saturn itself and that of Venus, the existence of the motions of binary stars, the first revelation of systems besides our own. He threw new light on the Milky Way and the constitution of nebulæ, and, in fact, was the first to give to the human mind any conception of the immensity of the universe. His catalogue of double stars, nebulæ, etc., and tables of the comparative brightness of stars, and his researches in regard to light and heat, would of themselves entitle him to the first rank as an astronomer and natural philosopher. For a notice of Herschel's telescope, see TELESCOPES. He erected one monster telescope, as it was then considered, of 40 ft. length. It was begun 1785 and finished 1789, on Aug. 28, of which year he by means of it detected the sixth satellite of Saturn.

HERSE, or HEARSE (Fr. *herse*, a harrow; hence a frame for setting candles in), had originally quite a different meaning from that in which it is now used. The term was applied to a bar or framework with upright spikes for the reception of candles, and was used at the ceremonies of the church and at funeral services. It was originally very simple in form, but in the 15th and 16th centuries herses of great splendor came into use, and were erected in the churches over the bodies of distinguished personages. The framework was of iron or brass, sometimes of beautiful workmanship, square, octagonal, etc., in plan, with pillars at the angles, and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, and lighted up with hundreds of wax candles, and decorated with wax images. From this the transition to the modern funeral hearse (see FUNERAL RITES) can be easily traced. In Catholic churches of the present day, the hearse still exists as a triangle with spikes, on which candles are placed.

HERSFELD, an old t. of Hesse-Nassau, northern Germany, situated on the left bank of the river Fulda, which here becomes navigable, 32 m. s.s.e. from the city of Cassel. The cathedral, built in the beginning of the 12th c., on the site of an older cathedral that had been destroyed by fire, was itself set fire to by the French in 1761. Its remains form a picturesque ruin. Pop. '71, 6,434, who carry on extensive manufactures of woolen cloth and serge.

HERSHIP, an old Scotch law term, denoting the offense of carrying off cattle by force.

HERTFORD, a co. in n.e. North Carolina on the Virginia border and the Chowan river; 320 sq.m.; pop. '70, 9,273—4,952 colored. The surface is hilly, and much of it is covered with forests. Chief productions: cotton, corn, and pork. Co. seat, Winton.

HERTFORD, a parliamentary and municipal borough, market-town, and capital of the county of the same name, is situated on the Lea, 26 m. n. of London by rail. It contains few buildings of any architectural importance, but there is a branch of Christ's hospital, a grammar-school, and several charity schools. Hertford carries on no manufactures; there are, however, linseed-cake mills and several malting and corn-mills in the town and vicinity. There are here a fairly attended corn-market on Saturdays, and three annual fairs. The town returns one member to parliament. Pop. '71, 7,894.

The old castle of Hertford (scarcely a fragment of which now remains) was built about 905. It was strengthened and repaired about the Conquest. The present castle is of the time of James I.; and in the early part of the century, it was used as a college for the students of the East India company's civil service. It now belongs to the marquis of Salisbury, and is a private residence.

HERTFORDSHIRE, or HERTS, an inland county of England, is bounded on the e. by Essex, on the s. by Middlesex, on the w. by Buckingham and Bedford, and on the n. by Cambridge. Area, 391,141; pop. '71, 192,226. The surface presents a pleasing succession of finely wooded hill and fertile valley. The chief elevations are those of the chalk downs, a branch of the Chiltern hills, which skirt the n. of the county. The principal rivers are the Lea and the Colne, both affluents of the Thames. Chalk, at a greater or less depth below the surface, forms the basis of the soil, which is various, much of it being, however, a mixture of gravel and loam, with a tract of rich loam on the borders of Essex. Climate, mild and healthy. The agriculture of the county has improved very much of late years. Immense quantities of hay and straw are sold off the land, and sent to London. Throughout the county there are numerous gardens and orchards, the fruit of which is sent to the London market. Great quantities of malt are made in the county. Ware is the chief seat of the malting trade in the kingdom. Paper and straw-plait are extensively manufactured in the w. and south. Three members are returned for the county.

HERTHA, HERTHUS or ÆRTHA, a deity of the ancient Germans. Her name is doubtless the root of the modern English *earth*, and the German *erde*. Tacitus states that she was worshiped with great solemnity by the Suevi, and that her temple stood in an island of the ocean, where her service was performed by a single priest. On great occasions which were regulated by this priest, the covered chariot of the goddess was drawn forth from the sanctuary by sacred cows and led in triumph throughout the country. Those districts through which the chariot passed were held to be peculiarly favored;

peace was always proclaimed, and the occasion celebrated by universal merry-making, until the priest declared that it was the will of the goddess to return to her shrine. Her image was then washed in a sacred spring, and all who witnessed the ceremony of the ablution were drowned. The island of Rugen was long thought to be identical with the sacred island of Hertha, but the same honor has been claimed for Heligoland and Zetland.

HERTOGENBOSCH, or HERZOGENBOSCH. See BOIS-LE-DUC.

HERTZ, HENRIK, one of the most distinguished of the Danish poets, was b. in Copenhagen in 1798, of Jewish parents. In 1832 he abjured Judaism, and joined the Protestant church. His first appearance as an author was in 1827, when he produced several clever vaudevilles and comedies, as *Kjerlighed og Politi, Hr Burchardt og hans Familje, Flyttedagen*, etc., while three years later, appeared his *Gjengangerbreve eller poetiske Epistler fra Paradis*, which exhibited such wonderful powers of imitating the style and spirit of other writers, more especially those of his countryman Baggesen, that public attention was at once arrested. Hitherto he had written anonymously, but the masterly manner in which he had stigmatized the affectations and puerilities which had perverted the literature and criticism of the Danish press, produced a perfect ferment in the literary circles of Copenhagen, which led before long to the discovery of the unknown writer. From this time his works followed one another in rapid succession; and striking out in an entirely different path from the one on which he had first entered, he produced, in 1837, a dramatic poem, *Svend Dyring's Huus*, founded on an old heroic saga, which his countrymen deem his masterpiece; among Germans, however, his lyrical drama of *Kong René's Datter* (1854) is his most popular work. He died Feb. 25, 1870.

HERULI, ÆRULI, or ERULI, a nomadic and warlike German tribe, who inhabited the n. shores of the Black sea, but afterwards divided into sections and wandered into different parts of Europe. They first appear in history in the 3d c., as taking part with the Goths in their excursions against the eastern provinces of the Roman empire. In the 4th c. they acknowledged the supremacy of the Gothic king Ermanric, but when Attila, king of the Huns, made his descent upon Gaul, they joined his standard. After the overthrow of the Huns, in which they suffered considerably, they established an organized and distinct confederacy on the banks of the Danube, and under the leadership of Odoacer, assisted in 476 in the overthrow of the Western empire. Under their king Rudolph they, in the beginning of the 6th c., attempted the subjugation of the Longobardi, but were defeated and dispersed, some of them proceeding to Scandinavia, and others being allowed by the emperor Anastasius to settle on the s. bank of the Danube. In the time of Justinian some of them embraced Christianity. A large portion of them afterwards joined the Gepidæ in their wars against the Eastern empire; but others fought with Justinian against the Vandals and East Goths. Towards the end of the 6th c. they became merged in other nations, and disappear from historical records. The Heruli were bold, hardy, and extremely pugnacious. For a considerable period they retained their strong individuality, and presented a firm resistance to the influences of surrounding civilizations. They are said to have offered human sacrifices.

HERVÉ (name assumed by Florimond Rouger), b. France, 1825; widely known as a composer of operatic music. *Don Quixote*, the first opera bouffe on the Parisian stage, was produced in 1847. Among his productions are *The Turks, Little Faust, Chilperic*, etc.

HERVEY, JAMES, 1714–58; b. England; educated at Northampton grammar school and Oxford university, where he came under the influence of John Wesley, and for some time manifested an inclination towards his theological opinions; but ultimately he adopted a thoroughly Calvinistic creed, and resolved to retain his connection with the established church. Having taken holy orders in 1737 he became curate to his father, and succeeded him in 1752. Laboring under the disadvantage of very weak health, he discharged his parochial duties conscientiously, and wrote works which, while of slight literary or theological value, rapidly became popular, and in many English and Scottish houses, especially of the humbler class, ranked with the *Pilgrim's Progress* and the *Whole Duty of Man*. His earliest work, *Meditations and Contemplations*, comprising *Meditations Among the Tombs, Reflections in a Flower Garden*, a *Descant on Creation*, and *Contemplation on the Night and Starry Heavens*, passed through 14 editions in as many years. *Theron and Aspasio*, which was equally well received, called forth some adverse criticism, even from the Calvinists, on account of tendencies which were considered to lead to Antinomianism, and was strongly objected to by Wesley.* It was influential in spreading in England the theological disputes to which Fisher's *Marrow of Modern Divinity* had given rise in Scotland, led to what is known as the Sandemanian controversy as to the nature of saving faith.

HERVEY, JOHN, Baron Hervey of Ickworth, 1696–1743; the *Narcissus, Sporus*, and *Lord Fanny*, in Pope's satires, a nobleman of political and social distinction in the reign of George II., son of John, first earl of Bristol. Educated and trained for public life at Westminster and Clare Hall, Cambridge, he became a favorite at the court of the prince and princess (afterwards George II. and queen Caroline), to which Pope, Gay, Arbuthnot, Chesterfield, and other wits resorted, and which was celebrated for the beauty and

accomplishments of its ladies. Hervey married Miss Lepell 1720. Having entered the house of commons as member for Bury, he was made vice-chamberlain to the king in 1730, and in 1733 sir Robert Walpole called him up to the house of lords, where he proved an effective speaker. In 1740 he succeeded lord Godolphin as lord privy seal, which office he held until the Walpole administration was driven from power, 1742. Nothwithstanding his miserable health he continued to take an active part in politics until his death. He was survived by his four sons, three of whom were successively earls of Bristol. Destitute of any commanding talents or solid principle, a skeptic in religion, and a profligate in morals, lord Hervey was yet far above the intellectual rank assigned him by Pope. He was a vigorous writer and speaker, a fair scholar, and the author of some pleasing verses.

HERWARTH VON BITTENFELD, KARL EBERHARD, b. Saxony, 1796; began his military life in 1811, and served in the field against Napoleon in 1814. He rose by successive grades, to be gen. of infantry. In 1864 he commanded the Prussian troops against Denmark, and June 29 captured the island of Alsen. In 1865 he commanded the 8th army corps; the following year he was appointed commander-in-chief of the army of the Elbe, and was conspicuous in several engagements. During the Franco-German war he was governor-general on the Rhine. He retired from service in 1871.

HERZ, HENRI, a pianist and composer for the pianoforte. He was born of Jewish parentage, at Vienna, in 1806, and educated principally in Paris, where his talent was early recognized; and his compositions became popular over Europe. He was received with great applause on visiting England in 1834, and America in 1846. In 1837 he received the decoration of the legion of honor; and in 1843 he became professor of music at the conservatoire. In 1865 he published in the *Moniteur, Mes Voyages en Amérique*. He also carries on the business of a piano manufacturer. Herz's music is characterized by elegance and a certain originality, and holds an important place among works written for the pianoforte.

HERZ, HENRIETTE, 1764–1847; b. Berlin; the daughter of a physician, who at 16 became the wife of Markus Herz, a rich and elderly citizen, and by reason of her rare beauty and superior intellectual attainments soon became a social leader. Schleirmacher and the Humboldts were among her intimate friends. She was left a widow in 1803, but maintained her position in society and kept up her relations to literary people during her whole life.

HER'ZEGOVI'NA is the name of a province of the Turkish empire, now occupied by Austria, lying between Bosnia, Montenegro, and Dalmatia. Under the Venetians, the Herzegovina was called the dukedom of St. Saba; at a later period, it went under the name of the county of Chulm; and in 1326 was again raised to the rank of a dukedom by the emperor Frederick III. As early as 1466, the Herzegovina fell into the hands of the Turks, remaining for more than two centuries afterwards the battle-field between Christians and Mohammedans. By the treaty of Carlowitz (1697), the Herzegovina was definitely annexed to the Turkish empire, with the exception of the town Castelnuovo and its outskirts, which up to this day belong to Austria. In the early history of Hungary, the Herzegovina plays a prominent part, as Bosnia and Bulgaria were long subject to the Hungarian crown. Its physical aspect, as also its political and ethnographical character, coincide with those of Bosnia (q.v.). In 1875 a serious insurrection, arising from the Turkish oppression of its Christian inhabitants, broke out in the Herzegovina, which rapidly spread into other semi-Christian provinces, and was supported by Montenegro and Servia. This ultimately led to the war of 1877–78 between Russia and Turkey; and the treaty concluded at the end of the war provided for introducing into Herzegovina, which during the troubles had been made a separate province, a measure of local autonomy. The Berlin congress in 1878 determined that Herzegovina, like Bosnia, should be occupied by Austria.

HERZEN, ALEXANDER, a Russian author, was b. at Moscow in 1816. In 1835, while yet a student, he was imprisoned for his political opinions, and banished. After 1842 he was permitted to reside at Moscow, under the strict surveillance of the police, and for some years devoted himself exclusively to literary labors. After 1847 he resided for some time in London. In his own country, Herzen's life was one long petty persecution. Herzen's literary performances are *Dilettantism in Science* (1842), *Letters on the Study of Nature* (1845–46), *Whose Fault is it ?* and *Doctor Kroupof* (both in 1847), *Recollections of My Travels* (1848), *On the Development of Revolutionary Ideas in Russia* (1851), *Baptized Property* (1853), or "Serfism," *Prison and Exile* (1854), *My Exile* (1855), *Interrupted Tales* (1856), *France or England* (1858), *Memoirs of Catherine II.* (1859), *The Old World and Russia, The New Phase of Russian Literature* (1864). In 1865 he took up his residence at Geneva, where he continued to publish the *Kolokol*, a Russian newspaper he had started while in London; but as he sided with the Poles in their last rising, the journal lost its popularity, and was given up. He died in 1870.

HE'SIOD, next to Homer the earliest Greek poet of whom we have any knowledge, was born probably in the 8th c. B.C., at Ascra, in Bœotia, whither his father had emigrated from the Æolian Kyme, in Asia Minor. He seems to have been at first a peasant or herdsman in quite humble circumstances—in his *Works and Days*, he speaks of him-

self as *átimētes*, "unhonored," "noteless." He afterwards left Ascra, and went n. to Orchomenos, on lake Copais, where he dwelt during the remainder of his life, and where in later times his tomb was shown. This is really all we know about Hesiod, for the marvelous stories of the Neo-Platonists afford us no intelligible clue to his personal history; and in the opinion of some critics, even throw grave doubts on his historical reality altogether. This, however, is probably too extreme a view. But while it may not be necessary to reject the personality of Hesiod, it may still be allowed that he was a "representative man," the founder and head of a school of poets—the Bœotian or Pierian—who stand in striking contrast with the older Ionic or Homeric school. Their original region was at the foot of Mt. Helicon, whence they spread over Bœotia, Phocis, and Eubœa. Their language and versification were nearly the same as those of the Homeric school, but in all other respects they appear to have been different, and even antagonistic, ignoring the sanguinary struggles of the heroic age, and preferring to sing of rural quietude and peaceful pursuits, the simple sanctities of household life, the homely duties of thrift, the education of children, and the prosaic details of commerce and politics. Hence the Spartan, Cleomenes, scornfully termed Hesiod the "poet of helots," while Homer was the poet of warriors. In fine, it may be said that the poetry of the Hesiodic school indicates an advance in civilization, morality, and thought, on the Homeric school.—The works either written by or ascribed to Hesiod are seven in number, of which the following are the more important: 1. *Erga kai Hemerai* ("Works and Days"), in the time of Pausanias, the only one considered to be truly Hesiod's by the people about Mt. Helicon; 2. *Theogonia* ("Generation of the Gods"), not considered genuine by Hesiod's countrymen, nor by most modern critics; 3. *Eoiai* or *Eoiai Megalai*, called also *Katalogoi Gunaikōn* ("Catalogues of Women"). Of these the first two are entire; while the well-known *Aspis Herakleos* ("Shield of Hercules") is supposed by some to be a relic of the third. The Hesiodic poetry was, in ancient times, if not warmly admired, at least held in great veneration. Both the priesthood and the philosophers considered the *Theogony* a great, in fact, the greatest authority, on the subjects of which it discourses, and almost all the great Alexandrine critics earnestly devoted themselves to its elucidation, but their commentaries have unhappily perished. Only here and there among the *Scholia* of the later Neo-Platonists some of their remarks are preserved. The most complete collection of these is to be found in Gaisford's *Poetæ Græci Minores*. The first edition of the Hesiodic poems appeared at Milan in 1493; subsequent editions are those of Heinsius (Amsterdam, 1667), of Robinson (Oxford, 1737), of Loesner (Leips. 1778), Gaisford, Göttling (1831), Schömann (1869), Köchly (1870), and Flach (1874).

HESPERIDES, the name of the famous sisters who, assisted by the dragon Ladon, guarded the golden apples which Hera had received, on her marriage with Zeus, from Ge. Their genealogy, as well as their number, are variously given by mythologists. The locality of the gardens was also a matter of controversy, the two favorite opinions placing them westward of Mt. Atlas, and n. of the Caucasus. The apples were stolen by Hercules (q.v.), but were afterwards restored by Athena.

HESSE (Ger. *Hessen*), a territory of Germany, occupied, in ancient times, by the *Catti* or *Chatti*, who first became known to the Romans in the year 15 A.D., when Germanicus destroyed their principal settlement of Mattium, the site of the present villages of Gross and Klein Maden, near Gudensberg. In the course of time, the Catti, who were settled in the districts now known as Upper and Lower Hesse, gradually merged in the Frankish tribes, with whom they took part in the great emigration into Belgium and Gaul, after which the territories which they had evacuated were occupied by Saxons, who thenceforward kept possession of the land known in after-ages as Saxon Hesse. The power of the chiefs had, in the meanwhile, become so firmly established under the Frankish empire, that on the fall of the Carlovingians, in 911, Conrad I. duke of Franconia and Hesse, was elected to the vacant throne of Germany, as being the most powerful of the princes of the empire. The various branches of the Hessian family still extant are descended from Heinrich I., surnamed the Child (died 1306), son of Sophie, duchess of Brabant. Although he himself exercised little real power, owing to the dismemberment of Hesse into numerous semi-independent principalities, his descendants gradually reunited these disjointed domains, and added many valuable territories on the Rhine to their old patrimony. Philip I., the magnanimous, who succeeded his father, Wilhelm II., as a minor, in 1509, introduced the reformation into Hesse, and founded the university of Marburg, with the revenues of the secularized convents and monasteries. This prince took an active part in the peasant and religious civil wars of his day; and by a will made in 1562, divided his territories among his four sons, who succeeded to their allotted possessions on his death in 1567. The eldest, Wilhelm IV., obtained the half of the Hessian domains, with Cassel for his residence; Ludwig, a fourth part, with Marburg; Philip, an eighth part, with Rheinfels; and George, an eighth part, with Darmstadt. The death of Philip and Ludwig left all the Hessian dominions in the two main lines of Hesse-Cassel and Hesse-Darmstadt (q.v.).

HESSE, ADOLPH FRIEDRICH, 1809–63; b. Germany; was the son of an organ maker. When but 9 years old, Adolph played so well on the organ as to astonish all who heard him, and in 1827 he was appointed assistant player in a church in Breslau, and in

1838–29 traveled over Germany giving concerts. He left about 80 compositions, including an oratorio, symphonies, and overtures.

HESSE-CAS'SEL, or ELECTORAL HESSE (Ger. *Hessen-Kassel*), was formerly an electorate of the Germanic confederation, consisting of one large and five smaller districts, including the countship of Schaumburg and Schmalkald, a part of Henneberg and Barchfeld, with various townships, impacted within the territories of other states. In consequence of the occurrences of 1866, it was annexed to Prussia on Sept. 16 of that year, and subsequently (Dec., 1868) went to form a part of the new province of Hesse-Nassau, which embraces, besides Hesse-Cassel, the greater part of Nassau (q.v.), part of Hesse-Homburg, and the Frankfort territory, being divided into the following two disrticts:

Districts.	Area in Sq. Miles.	Total Pop. in 1875.	Chief Towns.	Pop. 1875.
Cassel	3880	788,886	Cassel	56,745
			Hanau	22,409
			Fulda	10,749
Wiesbaden	2125	679,012	Wiesbaden	43,674
			Frankfort	134,776

Physical Character.—The country is generally hilly, and in some places even mountainous, forming a part of the great central elevated plateau of Germany. The most considerable of the ranges are the Habichtswald, the Thüringerwald, of which the greatest elevation is the Inselberg (2,930 ft.), the Meissner (2,350 ft.), the Hundsrück, Kellerwald, and Rheinhardwald.

The principal rivers are the Werra, with its numerous small affluents, but which only belongs in part to Hesse-Nassau; the Fulda, whose course appertains almost exclusively to the province; the Edder, Weser, Main, and Lahn.

Climate, Soil, Products.—The climate is generally mild, but in some of the mountainous districts, as the Rhöngebirge, it is at times very severe. The mean annual temperature is 48°,5 Fahrenheit.

The soil is almost unexceptionally fruitful and well adapted to agriculture. Cereals of all kinds yield good returns. The most cultivated districts are in the s.w. of Hanau, where much fruit and some good wines are produced. Flax is grown in Schaumburg and Lower Hesse, and tobacco in the valleys of the Werra. It is estimated that for every hundred parts the land is distributed nearly in the following ratio: woods, 40; arable land, 37; meadow land, 11; miscellaneous, 12.

The mineral products comprise copper, lead, cobalt, vitriol, alum, clay, large quantities of iron, coal, and salt, the last three of which are the property of the state. The mountain districts have many good mineral springs, the most important of which are those at Schwalheim, Wilhelmsbad, Hofgeismar, Rodenberg, and Nenndorf.

Industry, Imports, and Exports—Trade.—In addition to agriculture and the rearing of cattle and other animals, the chief branches of industry are the weaving of linen and yarn, which, although everywhere practiced, is prosecuted with most vigor about Fulda and Marburg. There are good steel and iron works at Schmalkald, and manufactories of guns at Cassel, and porcelain, glass, paper, and gold and silver wire-works in Hanau and other parts of the province. The exports consist principally of yarn and linens, iron and steel wares, fine clay, wood, leather, grain, dried fruits, and mineral waters. The transit-trade is considerable, and is principally conducted by way of Hanau, Carlshafen, and Eschwege. The internal commerce and industry center more especially in Cassel, Hanau, Frankfort-on-the-Main, Wiesbaden, Fulda, Gersfeld, Carlshafen, Dillenburg, and Limburg. There are many excellent public roads throughout the province, and upwards of 400 m. of railway, in addition to which it possesses great facilities for internal trade in its numerous navigable rivers.

Receipts, Expenditure.—According to the budget of 1864–66, the annual receipts of the electorate of Hesse-Cassel were about 5,108,310 thalers, and the expenditure 5,452,980, an excess of expenditure over the income of 344,670 thalers. The national debt in 1861 represented a capital of 3,700,000 thalers, but this was exclusive of 8½ million thalers, raised for the construction of railways, and 1½ million thalers extraordinary loans.

Army.—The army, prior to 1866, was kept at 12,000 men, of whom 5,000 were on the reserve list. Military service was compulsory between the ages of 20 and 27 years.

Education.—There are, besides numerous national schools, 10 gymnasia, 8 arts, and various polytechnic, theological, military, and other schools. Hesse-Nassau has one university at Marburg, memorable as being the first which was founded (in 1527) after the reformation, and without papal authority.

Religion.—The majority of the population belong to the Reformed or Calvinist faith, but the Lutherans, United Protestants, Catholics, and Jews are well represented. At the end of 1867 the number of Protestant churches in the province was 1375; Roman Catholic churches, 486; Jewish synagogues, 246; and other churches, 8. All the churches recognized by the state enjoy equal rights.

Law.—The supreme court of appeal is at Cassel, with two high courts of justice at Cassel and Fulda, under whose jurisdiction are various criminal and magisterial courts.

Electoral Hesse was formerly a limited monarchical government. The ruler bore the title of electoral prince and landgraf of Hesse, grand-duke of Fulda, prince of Hersfeld, Hanau, Fritzlar, and Isenburg, count of Katzenellenbogen, Dietz, etc. The dignity, which is hereditary in the male line only, is at present held by the elector Frederick Wilhelm I. The elector was assisted in the government by a council of ministers, who were partially responsible. A new constitution, based on the federal decision of 1857, was promulgated in 1860. There were two representative chambers, the higher of which comprised the princes of the electoral family, several *mediatized princes* (see MEDIATE), officers of state, and the higher nobility; while the lower chamber comprised 48 members, one-third of whom represented the landed proprietors, and the remainder the civic and rural districts. The chambers were convoked at least once in every three years. Each parish was presided over by a burgher-master (*bürgermeister*) or magistrate, each circle by a government official, and each province by a special governor.

Hesse-Cassel occupied the eighth place in the German confederation. It had three votes in the *plenum* or general council of the diet, and supplied a contingent of 6,626, and a reserve of 2,840 men to the federal army.

History.—Hesse-Cassel is the elder line of the house of Hesse, founded by landgraf Wilhelm IV., or the wise, son of Philip the magnanimous, who reigned from 1567 to to 1592, and held his court at Cassel. Wilhelm was succeeded by his son Maurice, who joined the Protestant church, and five years before his death resigned the government in 1627 to his son Wilhelm V. The latter fought on the side of Sweden during the thirty years' war, for which he was put under the ban of the empire. His two brothers, Hermann and Ernest respectively, founded the lines of Hesse-Rotenburg and Hesse-Rheinfels; and on his death in 1637 his widow assumed the regency for their young son, Wilhelm VI., and by her ability, secured for him, as an indemnification for the losses which the country had sustained during the war, the greater part of Schaumburg and the principality of Hersfeld. The successors of Wilhelm V. pursued the practice he had begun of hiring out Hessian soldiers to fight in the service of foreign princes, a practice by which the finances of the state were considerably augmented at the expense of the welfare and morality of the people; while, in some instances, it led to the formation of important alliances on the part of the reigning house. The landgraf, Friedrich I., who succeeded his father in 1730, had become king of Sweden in 1720, in right of his wife, the princess Ulrike Eleanor, sister of Charles XII. His brother, Wilhelm VIII., to whom he had resigned his Hessian territories, fought under the British and Hanoverian flag in the seven years' war, and gained considerable renown for himself and his troops during the course of the war, which was especially disastrous to the welfare of his states. Wilhelm's son, Friedrich II., persevered in the same course, and kept up a splendid court on the proceeds of the pay, amounting to £3,000,000, which the British government gave him for the services of the 22,000 Hessians who fought against the Americans in the war of independence. Friedrich, who had become a convert to the Romish church, died in 1785, and was succeeded by his son, Wilhelm IX., who reigned as Wilhelm I., after his elevation to the rank of an elector in 1803. This prince frequently shifted sides and parties during the French revolutionary and imperial war, fighting with his Hessian mercenaries first under British colors, then in conjunction with Prussia, and in 1806 as the ally of Napoleon, who in return for his aid promised to respect the neutrality of the electorate. After the battle of Jena, the French emperor, suspecting the motives which had actuated the elector in augmenting his army, threw troops into the Hessian territory, and at the peace of Tilsit incorporated the electorate in the newly formed kingdom of Westphalia. In 1813 Wilhelm returned to his dominions after the overthrow of French power in Germany, and at once began to restore the old order of things as far as he could; while he entered upon a course of vexatious litigation to recover the state lands that had been sold during his exile, and appealed to the diet with such importunate pertinacity for indemnification, that he obtained various important concessions at the congress of Vienna, although he failed in his wish to secure the title of king, of which he was especially ambitious. In accordance with the promise which he had made his subjects on his restoration to power, he summoned a body of jurists to construct a constitution; but no sooner was a draft of this new scheme completed, than he refused to fulfill his promises. His death in 1821 was regarded as a fortunate event for the electorate; but his son and successor, Wilhelm II., by his narrow policy, increased the rapidly growing disorders of the state, while his relations to his mistress, the obnoxious countess of Reichenbach, rendered him peculiarly unpopular with his subjects. These disorders were partially arrested by the retirement of the elector in 1831, and the nomination of the electoral prince to the rank of regent. But the history of the 16 years' regency of prince Friedrich Wilhelm exhibits only a series of intrigues at court, dissensions between the government and the representatives of the people, and a retrogressive policy, which left Hesse far behind other German states in material prosperity. The death of the old elector at Frankfort, whither he had retired on his abdication, raised the regent in 1847 to the rank of sovereign elector. The revolution of Paris, in 1848, extorted from the terrified prince many liberal promises of reform, some of which were redeemed; but in 1850,

after revoking many of his pledges, he summoned the obnoxious Hassenpflug and Haynau to govern the country. Hassenpflug's measures at length drew upon him a public charge of maladministration and treason; and he having persuaded the elector that his personal safety would be endangered if he remained longer among his subjects, the prince and his minister fled by night from Cassel to Wilhelmsbad. On Sept. 17, 1850, an ordinance proclaimed that the seat of government had been transferred to the latter place. Hassenpflug appealed to the confederation for its intervention, and Hesse became the rendezvous of troops; the Austrian and Bavarian contingents occupying the south, and the Prussians, apparently for the protection of the people against the elector, taking their position in the north. The threatened war was principally limited to angry protocols, but the result of the intervention was the restoration of the elector, who returned to Cassel. In 1852 a new constitution was promulgated, which in no way satisfied the people, whose conduct throughout the trying crisis had been marked by forbearance and moderation. But the policy of the government remained unchanged. In Oct., 1860, on the assembling of the chambers, a resolution was agreed to for addressing the elector, requiring the restoration of the constitution of 1831; but not till 1862, after much agitation and the interference of Prussia and Austria, did the elector so far accede to their wishes as to recognize the constitution of 1831 with the modification of 1849. In the war between Austria and Prussia, Hesse-Cassel having sided with the former, a Prussian army entered the electorate, and it was ultimately annexed to Prussia on Sept. 20, 1866.

HESSE-DARMSTADT, or HESSEN, a grand-duchy of Germany, extending (exclusive of small outlying portions) between 49° 24′ and 50° 10′ n. lat., and 7° 50′ and 9° 10′ e. long., and consisting of two nearly equal parts, separated by a strip of land belonging to Hesse-Nassau. The northern district is mountainous, being intersected by the Vogelsberg, and branches of the Taunus and Westerfeld; while the southern is level, except in the e., which is occupied by the Odenwald range. Hesse-Darmstadt is divided into the following provinces:

Provinces.	Area in sq. miles.	Pop. in 1875.	Chief towns.	Pop. 1875.
Upper Hesse	1280	254,036	Giessen	13,858
Starkenburg	1150	370,170	Darmstadt	43,695
Rhenish Hesse	525	260,012	Mainz	56,421

Giving an area of 2,953 sq.m., and a population, in 1875, of 884,218 for the entire duchy.

Physical Character.—Hesse-Darmstadt, which presents a succession of fruitful valleys and rich mountain slopes, is well watered, being traversed by the Rhine and Main, Neckar, Nahe, Lahn, Nidda, Edder, Nidder, and Wetter.—The climate of the northern districts of Hesse-Darmstadt is very much more severe than that of the southern or Starkenburg district, which shares the climate of South Germany.

Agriculture is in a very flourishing condition, nearly half of the soil being occupied by arable lands. Corn is grown in sufficient quantity for exportation, chiefly in Upper Hesse, where Indian corn, or maize, and flax are also largely cultivated, while hemp, tobacco, and poppies are raised in Rhenish Hesse. The southern districts, in which a great variety of fruit is grown, including figs, almonds, chestnuts, etc., are specially noted for the excellence of their wines, the choicest of which are the Niersteiner, Laubenheimer, Bodenheimer, and red Ingelheimer, grown in the vicinity of Mainz, the Scharlachberger near Bingen, and the Liebfrauenmilch in the districts around Worms.

The mineral products, which are inconsiderable, include copper, cobalt, iron, salt, and coal, the three latter of which are most abundant in the Wetterau districts.

Industry.—The principal branches of industry are, besides agriculture, the making of wine, which in good years yields a return of upwards of four million thalers; the manufacture of cottons, linens, and stockings, and the weaving of straw in Upper Hesse; the preparation of oils and leather; and the manufacture of paper, snuff, *papier-mâché* goods, etc. Hesse-Darmstadt is well provided with post-roads, and has a network of railways; while the steam-navigation of the Rhine, Main, and Neckar affords still more extensive means of communication, which, however, are partly or wholly closed during the winter months.

Revenue.—The budget for the years 1876–78 gives the following estimate of the financial condition of the grand-duchy: Annual receipts, 22,544,120 marks; annual expenditure, 20,294,564 marks; leaving a surplus of 2,249,556 marks. The public debt, incurred mainly for the construction of railways, amounted in 1874 to 15,510,500 marks.

Army.—The troops belonging to Hesse-Darmstadt form the 25th division of the army of the German empire, and belong to the 11th army corps. There is a military college at Darmstadt.

Education.—There are in Hesse-Darmstadt, besides its numerous national schools, 11 *real-schulen* (see GYMNASIUM), 6 gymnasia, various theological, technical, industrial, and agricultural schools; while higher educational wants are supplied by the university of Giessen, with its noble library, and numerous scientific institutions connected with it.

The chief towns support various scientific and literary societies, and the duchy generally is favorably distinguished in respect to the diffusion of knowledge.

Religion.—In regard to religion, the population was divided in 1871 as follows: Protestants, 589,272; Roman Catholics, 238,080; other creeds, 172; and Israelites, 25,373. The Lutherans have a consistory at Darmstadt, with three minor courts under its jurisdiction, while the Roman Catholic churches are under the supervision of a bishop who has his see at Mainz.

Law.—There is a supreme tribunal of law at Darmstadt, with lesser courts at Darmstadt, Giessen, and Mainz, and numerous local courts in country districts, in some of which trial by jury prevails.

Political Constitution, etc.—Hesse-Darmstadt supplied a contingent of 7,227 men, with a reserve of 3,098, to the federal army, occupied the ninth place in the German confederation (q.v.), and had 3 votes in the *plenum* or full council, and 1 vote in the limited council. Its army now forms the 25th division of the 3d army corps of the German empire. It is a limited monarchical state. Its ruler, who must be a Lutheran, bears the title of royal highness, and ranks as grand-duke of Hesse, and as a Rhenish grand-duke. The succession is hereditary in the female line in default of male issue. In accordance with the law of 1856 there are two legislative chambers of representatives, which must be convoked at least once in every 3 years, but the real power of the government rests with the council of state and the 4 ministries into which the several branches of the administration are divided.

History.—The line of Hesse-Darmstadt, the second main branch of the house, is derived from the Hessian count, George I., who, on the death of his father, Philip the magnanimous, in 1567, obtained the upper countship of Katzenellenbogen, with the town of Darmstadt for his residence, and succeeded in 1583, on the death of his brother without heirs, to a third of the patrimony of the latter. He was succeeded in 1596 by his eldest son, Ludwig V., while his third son, Frederick, became the founder of the Hesse-Homburg line (q.v.). Ludwig V., who acquired a portion of Upper Hesse, was the founder of the university of Giessen. Although Hesse-Darmstadt, like every other part of Germany, suffered considerably during the French revolutionary wars, it finally acquired a great addition to its territories through the agency of Napoleon. Ludwig X., who had succeeded his father as landgraf in 1790, joined the confederation of the Rhine, and after having acted against Austria in 1809, and in concert with the French in 1813, offered, after the battle of Leipsic, to act with the allies against France, on condition of being allowed to retain his various acquisitions of territory. He had assumed the title of grand-duke in 1806, and on that occasion he promulgated various legislative edicts, and annulled the pre-existing union of the Hesse-Darmstadt and the Hesse-Cassel diets. In 1814 he joined the German confederation, and made large cessions of territory to Prussia, Bavaria, and Hesse-Cassel, receiving by way of indemnification a portion of the French department of Donnersberg, or Mainz, extending to the Lahn, and the greater part of the principality of Isenberg, in right of which he assumed the additional title of a Rhenish grand duke. In accordance with the decree of the federal diet, Ludwig gave his subjects a representative form of government in 1820, the scheme of which was, however, so obnoxious to the assembled states, that the grand-duke and his advisers were compelled to withdraw it, and to substitute another in its place. The task of framing this constitution occupied several diets in succession, and gave rise to much angry discussion within and without the chambers. The death, in 1830, of the grand-duke, who from various causes was endeared to his subjects, widened these differences, and angry discussions soon arose in regard to the civil list to be accorded to the new grand duke, Ludwig II. In the course of the next few years, one diet after another was convoked and prorogued, but no material change was effected in the relative position of the chambers and the government. The death of the grand-duke, Ludwig II., in 1848, and the accession of his son and co-regent, Ludwig III., grand-duke until 1877, brought little change for the better. In the meantime it must, however, be admitted that, notwithstanding frequent dissensions in church and state, the duchy made considerable advances in material prosperity; railways were opened, and new roads formed; monopolies and other commercial restrictions removed; greater freedom permitted in the curriculum of the university, and a more liberal spirit infused into the system of the education imparted in the national schools. Although these and many other improvements were grudgingly yielded, they have been permanent, but the character of the grand-ducal policy has neither been liberal nor in accordance with the wishes and views of the majority of the people. See GERMANY.

HESSE-HOMBURG, formerly an independent German landgraviate, but now forming a portion of the kingdom of Prussia. The landgraviate was divided into the provinces of Homburg and Meisenheim; the former bounded by Hesse-Darmstadt and Hesse-Nassau, and the latter by Rhenish Prussia and the Bavarian palatinate.

Provinces.	Area in sq. miles.	Pop. (1861).	Chief towns.	Pop.
Homburg.....	32.90	12,617	Homburg.....	8,626
Meisenheim.....	73.08	14,200	Meisenheim.....	2,758

Giving 105.98 sq.m. for the superficial area, and 26,817 for the population of the entire landgraviate. The former of these provinces is a fruitful district lying on the slopes of the Taunus mountains, which produces grain, wine, and timber; while the latter is mountainous, and yields large quantities of coal and iron, and some excellent wine. The budget for 1861 gives the following amounts: namely, receipts, 500,520 florins; expenditure, 441,166 florins, leaving a surplus of 59,354 florins. The debt was, in 1865, 3,000,000 florins.

The troops of the landgraviate were 366 men, including a reserve of 100, which comprised the contingent of Hesse-Homburg to the federal army. Hesse-Homburg was represented by Hesse-Darmstadt in the limited council of the diet, but it held one independent vote in the *plenum* or full council. The established religion was Protestant, to which 19,000 of the inhabitants belonged, the great majority of whom were attached to the *reformirte kirche*, while there were 4,950 Catholics, and about 1000 Jews. Hesse-Homburg had a legislative representative chamber, and the government was divided into the three departments of justice, the interior, and finances.

The landgraviate was an integral part of Hesse-Darmstadt (to which it reverted on the failure of the direct line in 1866) till it was transferred, on the death of the landgraf, in 1596, to his younger son, Friedrich I., in whose family it remained as an independent state till 1866. Little change was effected in the province till the congress of Vienna, when it was augmented by the addition of Meissenberg. In 1817 Hesse-Homburg was admitted into the German confederation. In 1830 disturbances broke out in Meisenheim; but although they were soon quelled, in consequence of the powers accorded to the landgraf by the diet, several severe edicts were published in 1832 against the liberals, which excited considerable disaffection. The opening of the springs and baths at Homburg in 1833 proved an unexpected source of wealth to the state, and after the addition of gambling saloons, the establishment constituted a very important branch of the revenue. Attempts were more than once made by the diet to put down the gambling-tables; but whenever the pressure of federal intervention was removed, gambling was always resumed with fresh spirit; in 1862 however, the deputies passed a law for its gradual suppression, and since the passing of Hesse-Homburg into the hands of the Prussian government, the system has been completely suppressed. Since their first opening, play, with only temporary abatement, was prosecuted at all hours and seasons by all ranks, from peasants to princes and princesses, and almost at all ages, excepting among the subjects of Hesse-Homburg, who were stringently forbidden to participate in it.

In 1835 Hesse-Homburg joined the Zollverein (q.v.). In Mar. 1866, on the death, without heirs, of the last landgraf, Ferdinand Heinrich Friedrich, who succeeded his brother, Philip August, in 1848, the landgraviate fell to Hesse-Darmstadt, but remained united with that duchy only a few months, being ceded to Prussia on Sept. 13, 1866. It now forms part of the Prussian provinces of Hesse-Nassau and Rhenish Prussia. See GERMANY.

HESSE-NASSAU. See HESSE-CASSEL and NASSAU.

HESSIAN FLY, *Cecidomyia destructor* (see CECIDOMYIA); a dipterous insect, the larva of which has often proved extremely destructive to wheat in North America. Its ravages have occasionally even led to the abandonment of wheat culture for a time in considerable districts. It is black, with dusky wings, darker at the base, pale-brown legs, black feet, and hairy antennæ. There are two broods in the year. The maggots of the one brood live at the roots of the plants throughout the winter; those of the other are found in the lower joints of the straw, in the end of spring and beginning of summer.

HESSIAN FLY (*ante*). The eggs are laid on the young blades of the wheat, after the coming up of the plant in the fall, and also in the spring. The eggs are about $\frac{1}{50}$ of an inch long, with a diameter of only $\frac{4}{1000}$ of an inch, of a pale red color, and hatch in four or five days, if the weather be warm. The larvæ, as soon as hatched, descend between the leaf and the stalk till they reach a joint, just below the surface of the ground, at that stage of the plant's growth. Here they undergo their metamorphoses, being nourished by sucking the juices of the plant. All the transformations may require several months, sometimes a year, being often retarded by circumstances. It needs but very few of these insects to cause the plant to wither and perish. The larvæ attain their full size in five or six weeks when they are $\frac{1}{4}$ of an inch long, and have the appearance of a flax seed. In April and May the fly is released and soon begins to lay its eggs on the young wheat blades, of both autumn and spring sowing. The eggs attain the pupa state (flaxseed appearance) in June and July, the fly appearing in the autumn to lay the eggs for the next spring brood. Many of these do not come to maturity till after harvest, remaining for a time in the stubble in the pupa state. The Hessian fly is said to have been first seen in this country on Staten Island in 1776 near the place where sir William Howe disembarked the Hessian soldiers under his command; and from this circumstance received its name. The progress of the insect seems to have been about 20 m. in a year, usually migrating in swarms. It is a difficult pest to get rid of, and the eradication requires concert of action among the farmers. If the straw contain any insects in the pupa state it should be burned. The stubble should be cut quite long so as to give as much heat as possible when it is burned. Then plowing, and careful har-

rowing and collecting of the roots as far as practicable should follow, with drying, and burning. See *Insects Injurious to Vegetation*, by Dr. T. M. Harris.

HESTIA, a goddess of Greece, supposed to have been the latest in origin of the greater deities. She appears to belong to a particular stage in the advancement of civilization, and to embody the religious sanction that confirmed the social system then reached. The fact that Hestia is not mentioned in Homer shows that her worship was not then so universally acknowledged. Perhaps we may see in the connection of the Latin Jupiter and Vesta at Lavinium a relic of the worship of this same goddess under the same name (they are only two forms of the feminine of the passive participle of the root *vas*, burn), and an evidence of the connection between the two races. We find therefore in Hestia relics of the old pre-Greek worship; she is the altar-fire, presiding over all sacrifices, and sharing the honors of all the gods. The opening sacrifice was offered to Hestia; to her at the sacrificial meal the first and last libations were poured. The fire of Hestia was always kept burning, or if by any mischance it were extinguished, only sacred fire produced by friction, or directly obtained from the sun, might be used to rekindle it. But beyond this she is the goddess of family union, the personification of the idea of home, the protectress along with Zeus of the suppliants who fled for refuge to the hearth. To her therefore is ascribed the art of housebuilding. Hestia and Hermes are often united as the representatives of home and private life on the one hand, and of business and outdoor life on the other. The city union, moreover, is just the family union on a large scale; it has its center in the prytaneum, where the common hearth-fire round which the magistrates meet is always burning, and where the sacred rites that sanctify the concord of city life are performed. From this fire, as the representative of the life of the city, was taken the fire wherewith that on the hearth of a new colony was kindled. Even larger unions than the city had their central fire; in Tegea we find the Hestia of the Arcadians; and it is probable that the Achæans had theirs at Æginium. In the later mystic philosophy Hestia became the hearth of the universe, the eternal fire at the center of the world. As Hestia had her home in the prytaneum, special temples to her rarely occur. There was one in Hermione, where the only symbol of the goddess was a fire always burning on the hearth. We also hear of her house at Olympia. Her statue stood in the prytaneum at Athens beside that of peace. Though many statues of the Roman Vesta are preserved, more or less based on the Grecian conception of Hestia, yet no really Greek representation of the goddess has come down to us.

HES'YCHASTS (Gr. *Hesychazo*, to be quiet), a mystic and contemplative sect of the Greek church, who renewed in the 14th c. the errors and practices of the older Euchites, and who may be described as the Quietists of the east. There is reason to believe that the principles of the ancient mystics never entirely died out among the oriental monastic bodies; but they attracted an unusual share of public attention not only at home, but in the western church in the earlier half of the 14th century. A Basilian monk, named Barlaam, a native of Calabria, the ancient Magna Græcia, and himself of Greek origin, in the course of a visit to the monasteries of Greece, observed among the monks several practices and doctrines which he considered grievously reprehensible; and was particularly struck by the doctrinal abuses of the monks of Mt. Athos, the "holy mountain," the great stronghold of monasticism in Greece. In common with the mystics of all times, these monks placed all perfection in contemplation, and in the elevation and abstraction of soul which contemplation produces. But among many practices which he considered objectionable, there was one which especially provoked his reprobation, and, indeed, his ridicule. Believing that in the soul lay hidden a certain divine light, which it was the office of contemplation to evoke, they withdrew at stated times to a retired place, seated themselves on the earth, and fixed their eyes steadfastly on the center of the stomach (whence the sobriquet by which they were known, *omphalopsychoi, navel-souls*); and they averred that, after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region), and filled them with ecstasy and supernatural delight. They declared that this light was the glory of God himself, and they connected it in some unexplained way with the light which appeared at the transfiguration of our Lord upon Tabor. Barlaam denounced these notions as fanatical and superstitious. On the other hand they were explained and warmly defended by Gregory Palamas, the archbishop of Thessalonica; and in order to settle the controversy, a council was held in Constantinople in 1341 which terminated in the triumph of Palamas and the monks. The controversy afterwards turned upon a point of doctrine—namely, on the nature of the so-called divine light supposed to emanate from the soul in this state of contemplation. Other councils were called, one of which, in 1351, again pronounced in favor of the monks, through the influence, it was said, of the court and of the celebrated John Cantacuzenus, who was an ardent patron of the Hesychasts. But the public voice was hostile to the sect, and on the retirement of their patron Cantacuzenus, who, in 1355, became a monk, they fell into obscurity. The controversy about the "thaboritic light," however, is still discussed in Greek theology. See Mosheim, ii. 659; also Fabricius, *Bib. Græc.* v. 247, 454; Rubenberg, *De Hesychastis Exercitat*, p. 378.

HESYCH'IUS, a Greek grammarian of Alexandria, flourished, according to some authorities, towards the end of the 4th century. He was the author of a Greek lexicon taken partly from earlier works of a similar character, with the addition of new words and examples from the writings of poets, orators, historians, and physicians. Its value is very great, as it supplies us with extensive information concerning the Greek language and literature, especially of an antiquarian kind. The first edition is that published at Venice in 1514; the best is by Alberti and Ruhnken (2 vols. Leyden, 1746–66), to which additions were made by Schow (Leip. 1792). Compare Ranke, *De Lexici Hesychiani vera Origine et genuina Forma* (Leip. and Quedlinburg, 1831).—Not to be confounded with the foregoing is the historian HESYCHIUS of Miletus, surnamed the "Illustrious," who flourished in the beginning of the 6th c., and was the author of the following works: 1. A book on eminent teachers (*Peri tōn en Paideia lampsantōn Sophōn*); 2. Another on the city of Constantinople (*Peri tōn Patriōn Kōnstantinoupoleōs*); and 3. A chronicle or history (*Biblion Historikon*, etc.), commencing with the earliest times, and coming down to the death of Anastasius. It is now lost. See Orellius, *Hesychii Opera* (Leip. 1820).

HESYCHIUS, SAINT, d. Alexandria, Egypt, 311 A.D.; a bishop of the Christian church, and publisher, according to Jerome, of an edition of the New Testament, and also a revision of the Septuagint. He was martyred during the Diocletian persecution.

HETEROCER'CAL (Gr. *hetĕros*, different, unequal, and *kerkos*, a tail), a term introduced by Agassiz to designate a peculiarity of structure in the tail of some fishes, in which the tail is unsymmetrical with reference to the body of the fish or the vertebral column; the vertebral column being prolonged into the upper of the two lobes of the tail, and a second lobe, more or less distinct, appearing on the under side. The heterocercal tail is, among recent fishes, characteristic of the cartilaginous fishes, and is, therefore, a much less prevalent form than the symmetrical or homocercal (Gr. *homos*, equal, tail). It is very generally regarded as indicating an affinity to saurian reptiles. But in the older geologic formations, the heterocercal is the prevalent form; in all the formations older than the oolitic it exclusively appears.

HETEROGANGLIA'TA (Gr. *hetĕros*, diverse, and *ganglion*, a ganglion), a term introduced by Owen, and adopted by many zoologists, in accordance with a scheme of zoological classification founded on the nervous system in animals, to designate the *mollusca* of Cuvier, with which are ranked the "zoophytes" of the division *polyzoa* or *bryozoa*. The nervous centers or ganglia are not arranged in a longitudinal series of symmetrical pairs, but are variously distributed in different parts of the body; one principal ganglionic mass, however, occupying a position above the gullet, with which all the nerves of the special senses which exist are connected. With it, also, all the other ganglia communicate.—Whether or not the new name heterogangliata, may ultimately come into general use among systematic zoologists, it certainly indicates a most important character in the organization of the animals to which it is applied.

HETEROPODA. See NEUCLEOBRANCHIATA, *ante*.

HETEROPTERA. See HEMIPTERA, *ante*.

HETEROSOMATA, the group of flat fishes, as the halibut, flounder, plaice, etc., which have been classified by some naturalists as a sub-order of teleost fishes, but which are now generally placed as a family called *pleuronectidæ*, of the sub-order ANACANTHINI, of the order TELEOSTEI. See FLAT-FISH and PLEURONECTIDÆ.

HETMAN, or ATAMAN, the title of the head or general of the Cossacks, now retained only among the Cossacks of the Don. From the earliest times the hetman was elected by the voice of the assembled people; the mode of election being by throwing their fur-caps at the candidate they preferred, and the one who had the largest number of caps was declared duly elected. The power of the hetman was very great, and extended over life and death. When the Cossacks, in 1654, submitted to the Russians, the hetman was permitted to retain his rights as formerly. The empress Catherine entirely abolished the dignity of hetman of the Ukraine, and substituted a government consisting of eight members. The Don Cossacks have, indeed, retained their hetman, but even he possesses but the shadow of his former power. The last elective hetman was count Platoff, who played a prominent part in the wars with France (1812–14). After his death, the hetman was appointed by the czar, and ultimately the title was made hereditary in the grand-duke, the heir to the throne.

HEUGLIN, THEODORE VON, Baron, 1824–76; African and Arctic traveler, b. Würtemberg. He went to Egypt in 1851, and till 1865 the n.e. regions of Africa were the main scene of his labors. In 1852 he accompanied Dr. Reitz, the Austrian consul at Kartum, upon his fatal journey to Abyssinia; in 1853, having been appointed Dr. Reitz's successor in the consulate, he visited Kordofan and the lower course of the white Nile; and in 1857, on his return, after about two years' absence in Europe, he was commissioned by the grand-duke Ferdinand Maximilian of Austria to explore the countries along the w. coast of the Red sea. From the latter part of 1858 to the latter part of 1860 he was again in Europe; but in 1861 he was placed at the head of the Vogel search expedition, which included Munzinger, Steudner, and Kinzelback, and was expected to make its way to Wadai. Having reached Mai-shecha, however, the explorers broke up into

three parties, Heuglin accompanying Steudner and Schubert in the direction of Adoa, Gondar, and the Galla lands. At Khartum thay joined Miss Tinne's party, and proceeded to lake Rey and the Kosanga river, but Steudner died on April 10, 1863, and Heuglin was compelled by sickness to retrace his steps. He returned to Europe in 1865. In 1870 and 1871 he made a valuable series of explorations in Spitzbergen and Nova Zembla; but 1875 found him again in n.e. Africa, in the country of the Beni-Amer and Habab. An invitation from the khedive took him abroad again in 1876, but receiving no definite appointment he returned to Europe. Later in the same year he was engaged in preparing for an exploration of the island of Socotra, when he was suddenly carried off by inflammation of the lungs.

HEUSSER, META, 1797–1876; b. Switzerland; the daughter of pastor Diethelm Schweizer. In 1857 a volume of her poems appeared anonymously, edited by Albert Knapp, and in 1867 she published another volume at Leipsic under her own name. A selection of her most popular poems has been translated by Miss Jane Borthwick, and was published in 1875 under the name of *Alpine Lyrics*.

HEVE'LIUS (known also as HEVEL or HÖVELKE), JOHANN, one of the most celebrated astronomers of the 17th c., was b. at Danzig in 1611, and d. in that city in 1687. He belonged to an honorable and wealthy family; and in 1641 he erected an observatory in his own house, and furnished it with large telescopes constructed by himself. He published numerous astronomical works. Hevelius was the first astronomer, with the exception of Gassendi, to observe a transit of Mercury (Gassendi's observation was made in 1631, that of Hevelius in 1661); and it is now generally conceded that he ranks next to Flamsteed amongst the astronomers of his day. Delambre devotes ten pages to the notice of his labors in his *Histoire de l'Astron. Mod.*, and his life has been written by J. H. Wesphal (Königsb. 1820).

HEVES, a co. in n.w. Hungary, 1462 sq.m.; pop. 216,633. It is mountainous, except in the s.e., which is a part of the great plain of Hungary. Products: wine, corn, and tobacco. Chief town Gyöngyös.

HEVES', a small t. of Hungary, in the co. of the same name, is situated in the midst of a productive flax and hemp growing district, 60 m. e.n.e. of Pesth. Pop. '69, 5,703.

HEWES, JOSEPH, 1730–79; b. N. J.; one of the signers of the American declaration of independence; educated at Princeton; became a merchant in Philadelphia, and, removing to North Carolina, was chosen delegate to the continental congress, of which he was a member, with a brief interval, for five years.

HEWIT, AUGUSTINE FRANCIS, b. Conn., 1820; graduated at Amherst, and became a minister in the Protestant Episcopal church. In 1846 he embraced the Roman Catholic faith, and two years later joined the Paulists, and became professor in their seminary in New York. He has published *Problems of the Age* and *Light and Darkness*, and has written much for magazines.

HEWIT, NATHANIEL, D.D., 1788–1867; b. Conn.; graduated at Yale college in 1808. After teaching for some years, he was licensed to preach in 1811. He studied theology at Andover, and was pastor of a Presbyterian church at Plattsburg, N.Y., 1815–17, and of a Congregational church in Fairfield, Conn., 1818–27, and in Bridgeport, Conn., 1830–62. He was one of the founders of the East Windsor theological seminary, afterwards removed to Hartford.

HEWITT, ABRAM STEVENS, b. N. Y., 1822; graduated at Columbia college, and studied law, but turned his attention to iron manufacture, and became the head of an extensive business in New Jersey. In 1867 he was one of the commissioners to the Paris exposition. He was elected to congress in 1874, 1876 and 1880. He is the son-in-law of Peter Cooper, and has been secretary of the Cooper institute from its organization.

HEX'ACHORD, a name given by the ancient Greeks, in their music, to the great sixth. In modern music, hexachord denotes the six diatonic degrees of which Guido formed his scale, better known by the six syllables, ut, re, mi, fa, sol, la, to which the scale was sung

HEX'AGON (Gr. *hex*, six, and *gōnia*, angle), a figure of six sides and six angles; when the sides and angles are equal, it is called a *regular hexagon*. If a regular hexagon be inscribed in a circle, the radius of the circle is equal in length to each side of it, and by joining the center with the angular points, six equilateral triangles will be formed. This property of the hexagon furnishes a very simple method of dividing a circle into six equal parts, and at the same time constructing the hexagon, by merely laying off round the circle lines equal to the radius. Of the three figures which can completely occupy space (the equilateral triangle, square, and hexagon), the hexagon contains the greatest area within a given perimeter, the proportions between the three different figures being nearly as the numbers 4, $5\frac{1}{5}$, 6. It is thus that bees, by making their cells of a hexagonal form, inclose the greatest space with the least expenditure of wax.

HEXAHE'DRON (Gr. *hex*, six, and *hēdra*, base), so called from its having six faces, is one of the five regular solids, according to Plato; but in modern times the term cube

(q.v.) has been used in this signification, and the hexahedron is taken to include all solid figures of six faces.

HEXAM'ETER (Gr. *hex*, six, and *metron*, a measure), the name applied to the most important form of classical verse. It is the heroic or epic verse of the Greeks and Romans, the grandest examples of which are the *Iliad* and *Odyssey* of Homer, and the *Æneid* of Virgil. It consists, as its name implies, of six feet or measures, the last of which must be a spondee (a measure composed of two long syllables), and the penultimate a dactyl (one long syllable and two short). If the penultimate is also a spondee, the verse is said to be spondaic. The following are examples of the hexameter:

Pōllă d'ă|nāntă, kă|tāntă, păr|āntă tĕ | dōchmăă | t'ēlthōn.
HOMER.

Tītyrĕ | tū pătū|læ, rĕcŭ|bāns sūb | tēgmĭnĕ | fāgī.
VIRGIL.

The hexameter has been frequently employed in modern poetry, especially in German and English. The facility with which the first of these languages forms compounds is favorable to its use; and Klopstock, Goethe, and Voss have produced admirable specimens of this kind of verse. It has been doubted whether the English is not too stubborn and intractable for the free-flowing majesty of the hexameter; and no small discussion with regard to this point has been carried on among scholars of the present day; although many think that the *Evangeline* of Longfellow, and to some extent the *Vacation Ramble* of Clough, have definitely settled the question in favor of the practicability of this measure being adopted into English. Our readers may judge from the opening lines of *Evangeline:*

This is the | forest prim|eval. The | murmuring | pines and the | hemlocks
Bearded with | moss, and with | garments | green, indis | tinct in the | twilight,
Stand like | Druids of | old, with | voices | sad and pro|phetic,
Stand like | harpers | hoar with | beards that | rest on their | bosoms.

The last two lines show where English versification is weak—viz., in its spondees, unaccented syllables being compelled to do the duty of accented ones.

HEX'APLA (Gr. *hexapla*, "the sixfold"), a celebrated edition of the Septuagint version, compiled by Origen for the purpose of restoring the purity of its text, and bringing it into closer agreement with the original Hebrew. Owing to the multiplication of transcripts of the Greek text, numerous errors had crept in; and in the frequent controversies which arose between the Jews and the Greek or Hellenist (q.v.) Christians, the latter, in appealing to the Greek text, were often mortified by the discovery that it by no means represented faithfully the Hebrew original. In order to meet this evil, Origen undertook to provide a means of at least verifying the genuine Greek text, as well as of confronting it with the original. With this view he prepared what is known as his *Tetrapla*, or "fourfold" version, which he afterwards extended into the hexapla. The *Tetrapla* contained, in four parallel columns, the Septuagint version, together with those of Aquila, Symmachus, and Theodotion. The hexapla contained, in addition, the Hebrew text, together with a transcript of that text in Greek characters. In some parts of the Old Testament there were superadded one, two, and even three other versions; so that in some parts the work contains nine columns, whence it is occasionally designated the *Henneapla*, or "ninefold." Of the origin of these latter versions but little is known.

The hexapla, however, was something more than a mere compilation of these versions. In the margin were given notes, chiefly explanatory, as, for instance, of the Hebrew names. But a still more important characteristic of the work were its restorations and corrections of the original, in which Origen was guided chiefly by the version of Theodotion. This, however, he did not effect by arbitrary alterations of the received text; but, while he retained the common text, by indicating with the help of certain signs (an asterisk for an addition, an obelisk for a retrenchment), the corrections which he sought to introduce. Both these texts, the common (*koiné ekdosis*) and that of the hexapla, are found combined in existing MSS. The hexapla, as a whole, has long been lost; several editions of those fragments of it which it has been possible to recover have been printed; by far the most complete of which is that of the celebrated Benedictine, Montfaucon (2 vols. fol., Paris, 1714), which retains, so far as it was preserved in the MSS., the arrangement and even the asterisks and obelisks of Origen. For a more detailed account, see the preface and *Prælimĭnaria* of this learned work.

HEXHAM, a small market t. of England, in the co. of Northumberland, is agreeably situated on the right bank of the Tyne, 20 m. w. of Newcastle. The Tyne is here crossed by a bridge of nine arches. The priory church, an old cruciform structure of the 12th c., is now used as the parish church. It has a lofty central tower, and at its western end are remains of the magnificent monastery erected in the 7th c. by St. Wilfrid. The chief manufactures of the town are gloves and hats. Pop. '71, 5,331.

HEYDEN, JAN VAN DER, 1637–1712; a native of Holland, an architectural landscape painter, contemporary with Hobbema and Jacob Ruysdael. He cared little for country

scenes, but excelled in reproducing the bricks of old Dutch houses, and was thoroughly master of lineal perspective.

HEYLIN, Dr. PETER, an English divine, of considerable note in his own day, was descended from an ancient Welsh family belonging to Montgomeryshire, and was b. at Burford, in Oxfordshire, Nov. 29, 1600. He studied at Oxford, where he took the degree of D.D. Through the interest of Laud, in whose theory of church and king he devoutly believed, Heylin was appointed chaplain-in-ordinary to king Charles in 1629. Subsequently he held a variety of livings, but was deprived of them during the period of the commonwealth. At the restoration, he was made subdean of Westminster, an office which many of his friends thought an utterly inadequate reward of his literary services to the royal cause. He died May 8, 1662. Heylin was a very voluminous controversial writer, but his works are of no value now, except as illustrative of the age in which he lived and the ecclesiastical party to which he belonged. Among others may be mentioned, *History of the Sabbath; Ecclesia Vindicata, or the Church of England Justified; Theologia Veterum; Examen Historicum*, containing, among other things, a violent attack on Fuller's *Church History*, which involved him in a controversy with that author; *Historia Quinquarticularis*, or a defense of Arminianism; *History of the Reformation of the Church of England;* and *Ærius Redivivus, or the History of the Presbyterians.*

HEYNE, CHRISTIAN GOTTLOB, a German scholar of great celebrity, was b. at Chemnitz, in upper Saxony, Sept. 25, 1729. His father was a poor weaver. The pastor of Chemnitz, himself very poor, got Heyne educated at a school in the suburbs, and afterwards sent him to Leipsic university, but forgot to give him money for his support. His sufferings here were something frightful, but his endurance was heroic. In 1753 he obtained the situation of under-clerk in the Brühl library at Dresden. While in this humble office, he prepared his edition of *Tibullus*, which saw the light in 1755, and happening to fall into the hands of Rhunken of Leyden, excited the admiration of that scholar. In 1756, unfortunately for Heyne, the seven years' war broke out. Frederick the great marched against Dresden, and burned, among other things, the Brühl library, but not before Heyne had edited, from a *codex* there, the *Enchiridion* of Epictetus. For some time he led a precarious life, being often without employment and without bread. In 1761 he married, and supported himself as best he could by writing for the booksellers; and in 1763, on the death of Gessner, professor of rhetoric at Göttingen, he was appointed his successor on the recommendation of Rhunken of Leyden (who had not forgotten his editions of *Tibullus* and *Epictetus*). This closed his period of misfortune. The rest of his long life was spent in peace and comfort and professorial activity. He died July 12, 1812. The principal works of Heyne, besides those mentioned, are his editions of Virgil (1767, 6th ed. 1803), Pindar (1774), Apollodorus (1787), Pliny (1790), Conon and Parthenius (1798), and Homer (8 vols. 1802; 2d ed. 1804). He also executed "almost a cart-load of translations," besides "some ten or twelve thick volumes of prolusions, eulogies, and essays," of which six volumes were published separately under the title of *Opuscula Academica* (Götting. 1785–1812); and, finally, about 7,500 reviews of books in the *Göttinger Gelehrten Anzeigen*, of which he was director from 1770. In addition to this herculean work, he had a private class or *seminarium* for the advanced study of philology and classical antiquity, from which he sent forth, in the course of his life, no less than 135 professors. Compare the Life of Heyne by his son-in-law, Ludwig Heeren (Götting. 1813), and Carlyle's essay on the same.

HEYWARD, THOMAS, 1746–1809; b. S. C.; went to London for his education, and on return practiced law. He was in the congress of 1776, and was one of the signers of the declaration of independence. He was a judge after the peace until 1798.

HEYWOOD, a large and populous t. of Lancashire, England, 8 m. n. of Manchester, on the left bank of the Roach, a branch of the Irwell. It is connected with the Rochdale canal by a branch canal; and it is on the Lancashire and Yorkshire railway. Heywood has recently increased with great rapidity both in population and wealth, partly in consequence of extensive coal-mines in the neighborhood, and partly through manufactures of various kinds. It has become an important seat of the cotton manufacture. Fustians, calicoes, nankeens, ticks, and other cotton fabrics are produced. Iron-founding, boiler-making, and the manufacture of power-looms are also extensively carried on. Pop. '71, 21,248.

HEYWOOD, JOHN, 1500–65; known as "the epigrammatist," educated at Oxford, and afterwards made the acquaintance of sir Thomas Moore, who introduced him at court. His skill in music and his ready wit made him a special favorite with Henry VIII., and afterwards with his daughter queen Mary. On the accession of Elizabeth, Heywood, who was a zealous Catholic, retired to Malines in Belgium, where he died in 1565. A collection of his works was published in 1562.

HEYWOOD, THOMAS, an English dramatist of the 16th and 17th centuries. In the preface to the *English Traveler*, written in 1633, he describes himself as having had "an entire hand or at least a main-finger in two hundred and twenty plays." Of this number, which probably afterwards was much exceeded, for his last published piece did not appear until 1655, only three-and-twenty survive; but they amply attest that had he chosen to concentrate his powers he might easily have ranked with the Massingers,

Fords, and others of his great contemporaries. His best pieces, such as *A Woman Killed with Kindness*, *Fortune by Land and Sea*, *the English Traveler*, and *The Fair Maid of the West*, belong chiefly to the domestic drama.

HEZEKI'AH (Heb. *Hiskiah*, *Yehiskiyahu*, "May Jehovah strengthen him"), King of Judah, son and successor of Ahaz, reigned from 726 [725] to 696 [697] B.C. "There was none like him among all the kings of Judah," is the praise bestowed upon him in 2 Kings xviii. 5, and scarcely less flattering is the account preserved of this monarch in 2 Chron. xxix. From the moment that, at the early age of five-and-twenty, he mounted the throne, his efforts seem chiefly to have been directed towards the abolition of the idolatry which reigned paramount in the land, and the restoration of the worship of Jehovah to its pristine purity and glory. The temple was reopened, the priests and Levites whose genealogies had proved correct had their ancient revenues assigned to them, and recommenced the daily service; and the first passover which fell in Hezekiah's reign, was—albeit a month after the appointed season—celebrated with almost unparalleled pomp for full 14 days, amidst a vast concourse of people, not only of Judah, but even of Israel. Victorious in the wars he waged with the Philistines, and relying on an Egyptian alliance, into which he had entered against the advice of Isaiah, Hezekiah dared also to withhold the annual tribute imposed by Shalmanassar in the days of his father: whereupon, as would appear from cuneiform records, Sargon, Shalmanassar's successor, invaded Judea, but without success. When, however, Sargon's successor, Sennacherib, on his way to Egypt and Ethiopia, had already seized Lachish, or, according to Chron. and Isaiah, "all the fortresses" of Judea, nothing remained for Hezekiah but to ask for peace, and to offer any ransom that Sennacherib might deem fit to impose. Sennacherib took an enormous sum in silver and gold, for which the sacred treasury and the very doors of the temple were laid under contribution: perhaps only a stratagem to convince the conqueror of the poverty of the royal coffers. It is a moot-point whether Sennacherib, after having received the money intended to procure the peace, treacherously marched upon Jerusalem at once, or whether he continued his march to Egypt, and being beaten there before Pelusium, besieged Jerusalem on his return—which would be equal to a second invasion. Hezekiah's efforts to render his capital impregnable were futile. Suddenly, however, "an angel of the Lord" (explained variously to mean the plague, an earthquake, a sudden attack by Tirhaka, or the simoom) *slew* during one single night 180,000 men in the Assyrian camp, and Sennacherib was obliged to retreat. Whether Hezekiah's illness—"shechin," ulcers, according to some, or the plague, as others understand that word—took place before or after Sennacherib's invasion, is not fully established as yet; certain it is, that after his miraculous recovery, indicated to him by the retrograde movements of the dial, he among other visits of congratulation also received that of the ambassadors of Merodach Baladon (Mardocampados), king of Babylon. The latter—as would appear from the Chaldean historian Berosus—was at that time likewise tributary to Assyria, and sent the embassy with a view to securing Hezekiah's co-operation against the common enemy. Hezekiah, imprudently enough, made a great display of his treasures, his magazines, and arsenals; but so far from impressing the messengers with his greatness, he only kindled in Merodach Baladon the desire to possess himself of all these things; and the later Babylonian invasion, ending in the captivity, is undoubtedly to be traced back to this act of vanity on the part of Hezekiah.

The remainder of Hezekiah's life was passed in profound peace and prosperity, so that he was enabled to turn his attention to the internal development of the resources of the country and the fortification of its towns. He collected great treasures and executed many highly useful works, among which the aqueducts of Jerusalem take a foremost place. His was also the golden age of prophetic poetry. Besides Isaiah, there lived in his time the prophets Micah and Nahum. From a passage in Prov. xxv. 1, it would also appear that he founded a society of literati, who collected and arranged the ancient documents of Hebrew literature, more especially the Proverbs attributed to Solomon. Hezekiah himself was a poet of no mean order; witness the hymn he composed after his recovery. Hezekiah died at the age of 54 years, in the 29th year of his reign, and was succeeded by his son Manasseh.

The Mishna (Pes. 4, 9) enumerates three things for which Hezekiah is to be praised, and three things for which he is to be blamed. The unworthy burial of his father, on account of his wickedness; the breaking of the brass serpent of Moses, which had become an object of idolatry; and the hiding of a "book of medicaments"—some superstitious work—are the three good deeds. His spoiling the doors of the temple, to pay the tribute to Sennacherib; the stopping up of the upper Gihon during the siege of Jerusalem; and his postponing the first passover for a month (see above), are his three wicked deeds.

HIACOOMES, 1610-90; said to have been the first Indian convert to Christianity in New England. He was taught to read, and was for a time a preacher on the island of Martha's Vineyard, where he formed a church and became its first pastor.

HIBBARD, FREEBORN GARRETSON, D.D.; b. N. Y., 1811; at 18 years of age became a Methodist preacher. He labored in w. New York for 30 years. In 1860 he was chosen editor of the *Northern Christian Advocate*, but in 1864 he resigned preaching.

Among his works are *Baptism, Geography, and History of Palestine; Religion of Childhood*, etc.

HIBERNA'TION (from *hibernare*, to pass the winter) is the term applied by naturalists to express a peculiar condition of sleep in which certain animals—chiefly cheiroptera and rodentia—pass the winter season. It is not very clearly known to what extent hibernation prevails in the animal kingdom. The bats, the hedgehog, the badger, and the dormouse are the animals which in England present the most striking examples of this phenomenon. No birds hibernate in the British isles. The term hibernation is not a good one, because summer heat produces in some animals a very similar condition to that which winter cold produces in others; hence the Germans use the words *Winterschlaf* (winter sleep) and *Sommerschlaf* (summer sleep) to express the two similar if not identical conditions.

The following are the most marked peculiarities presented by bats, hedgehogs, and dormice, when in a state of perfect hibernation: The respiration is very nearly suspended, as is shown (1) by the absence of all detectable respiratory acts; (2) by the almost entire absence of any change in the air in the bell-jar, or case in which the animal is placed during the investigation; (3) by the subsidence of the temperature to that of the atmosphere; and (4) by the capability of supporting, for a great length of time, the entire privation of air. The circulation is reduced to an extreme degree of slowness. In an observation made by Dr. Marshall Hall, the heart of a bat was observed to beat only twenty-eight times in the minute. The excretions are very scanty. The bat is observed to have scarcely any excretion during its continued lethargy. In regard to the nervous system, sensation and volition are quiescent, but reflex or excito-motary actions are very readily produced. The slightest touch applied to one of the spines of the hedgehog, or the merest shake given to a bat, induces one or two inspiratory movements. Dr. Marshall Hall made the important discovery that, while the respiration is almost totally suspended, the muscular irritability is proportionally augmented. All hibernating animals instinctively adopt various measures to secure themselves, during the lethargic period, from sources of disturbance and excitement. They choose sheltered and retired situations, as caves, burrows, etc. Some form themselves nests; others congregate together in large numbers. The hedgehog and dormouse roll themselves up into a ball; the bats group together in clusters, with the head downwards, and in some species the wings are spread, so that each individual embraces and shelters its neighbor. Revivescence is due partly to the return of warmth, but mainly in all probability to the calls of hunger. The return of the respiration and animal heat to the normal standard is very gradual.

The physiological use of hibernation is doubtless to enable certain animals to avoid the consequences of severe winter cold, and (especially in the case of the insectivorous animals) the deprivation of food. Before the period of hibernation, a large amount of fat is accumulated in the organism, and this fat constitutes the fuel on which the animal lives and supports its comparatively trifling heat during the winter. The other tissues suffer to a less extent, and the total loss of weight is sometimes nearly 40 per cent—a proportion fully as great as that which is usually sustained in death by starvation. For a full account of the phenomena of hibernation, the reader is referred to Barkow, *Der Winterschlaf nach seiner Erscheinungen im Thierreich dargestellt* (Berlin, 1846)

HIBER'NIA, IBERNIA, IVERNIA, also **IERNE,** names by which Ireland is designated in the classical writers. The first mention of Ireland in ancient times occurs in a poem on the Argonautic expedition, attributed to the mythical Orpheus, and perhaps as early as the time of the first Darius. Aristotle speaks of two islands situated in the ocean beyond the pillars of Hercules, "called Britannic, very large, Albion and *Ierne*, beyond the Celtæ." Both Diodorus Siculus and Strabo report the natives to be addicted to cannibalism; but, by their own admission, on insufficient grounds. Pomponius Mela, with quite an Irish warmth of eulogy, declares the herbage to be so luxuriant that the cattle who feed on it sometimes burst. Pliny repeats this statement, and adds that the Hibernian mother trains her child from the very first to eat food from the point of a sword. But the most important of all classical authorities on Hibernia is Ptolemy, who describes the country, and gives the names of the principal rivers, promontories, seaports, and inland towns. The island was never conquered, nor even explored, by the Romans. See IRELAND.

HIBIS'CUS, a genus of plants of the natural order *malvaceæ*, the type of a tribe or suborder distinguished by a double calyx and fruit of three or more many-seeded carpels united into a many-celled capsule. The species are numerous, natives of warm climates, some of them trees or shrubs, but most of them large herbaceous plants, annual or perennial. The flowers of many are very beautiful. *H. syriacus*, sometimes called *althæa frutex*, a native of Syria and Carniola, has long been in cultivation as an ornamental shrub, and proves sufficiently hardy in many parts of Britain. Some are favorite hothouse plants. The characteristic mucilaginous and fibrous properties of the *malvaceæ* are very strongly developed in this tribe. *H. abelmoschus* (or *abelmoschus esculentus*) so abounds in mucilage that it is much used in the n.w. of India for clarifying sugar. The fruit of *H. esculentus* (or *abelmoschus esculentus*) is in general use both in the

East and West Indies for thickening soups, and otherwise as an article of food. It is called GOMBO, GOBBO, and OCHRO in the West Indies; BANDIKAI, RAM-TURAI, and DENROOS in different parts of India; and BAMMIA in the w. of Africa: if indeed the East Indian *H. longifolius* and the African *H. bammia* are, as seems probable, mere varieties. It is an annual plant, with a soft herbaceous stem, 3 to 5 ft. high, crenate leaves, axillary sulphur-colored flowers, and pyramidal, somewhat podlike capsules. It is cultivated in some parts of the s. of Europe. The fruit is used in an unripe state. It is generally much esteemed, but is disliked by some on account of its viscidity. It enters, as an important ingredient, into the *pepper-pot* of the West Indies. The ripe seeds are sometimes used in soups as barley. The bark of *H. tiliaceus*—a tree of 20 ft. high, with a very thick bole—so abounds in mucilage that by chewing it the natives of the South Sea islands obtain nourishment in times of scarcity. This tree, the BOLA of Bengal—supposed to be the same with the MOHO or MOHAUT of the West Indies (*H. arboreus*)—is one of the most abundant trees of the South Sea islands; and the wood, being light, tough, and durable, is much used for many purposes. The bark is very fibrous, and cordage and matting are made of the fiber in various tropical countries. Many other species yield fibers, some of them coarse, some of them fine and beautiful, which are used in different countries; but the most important in this respect is *H. cannabinus*, the AMBAREE HEMP and DECKANEE HEMP of western India, called PALUNGOO at Madras, and MAESTA PAUT in Bengal; a plant very generally cultivated in all parts of India, although nowhere to a great extent. It is an annual herbaceous plant, having a straight unbranching stem, 3 to 7 ft. high. The fiber is not so strong as hemp, and is useful only for ropes and coarse fabrics. It has been suggested that many species of hibiscus might be found valuable for the manufacture of paper.—*H. sabdariffa* is very generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy, and acquires a very pleasant acidity. It is much used for making tarts and jelly, and a decoction of it, sweetened and fermented, affords a refreshing beverage, well known in the West Indies as *sorrel cool drink*, the plant being called RED SORREL. *H. abelmoschus* (or *abelmoschus moschatus*), sometimes called MUSK-SEED, another plant common in widely separated tropical countries, is cultivated for its seeds, which have a fragrance between that of musk and that of amber. They are much used by perfumers, and are called *ambrette* or *graines d'ambrette*. In Egypt and Arabia they are mixed with coffee, and stimulant and stomachic qualities are ascribed to them. The petals of *H. rosa-sinensis* are astringent, and are used by the Chinese to stain their eyebrows and their shoes black.

HICCOUGH, or HICCUP, consists of sudden short convulsive inspirations, attended with a peculiar sound produced in the larynx, and immediately followed by expiration. The movements concerned in the production of hiccough are a spasmodic contraction of the diaphragm, and a certain degree of constriction in the glottis, which occasions the peculiar sound, and limits the amount of air inspired. These convulsive inspirations commonly occur in paroxysms, and succeed each other at intervals of a few seconds. The paroxysm may last only a few minutes, or may extend to hours or days; in the last-named case, it may be dangerous to life, from the exhaustion which it causes, but usually it merely excites a feeling of uneasiness or slight pain about the region of the diaphragm.

A debilitated state of the system predisposes to hiccough. In those predisposed to it, any gastric derangement, as emptiness, or over-distention of the stomach, the ingestion of cold water, excessive acidity, etc., will provoke it. Certain diseases are frequently attended by hiccough.

When the attack is slight, it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus held in a state of voluntary contraction. Strong pressure, as a belt tightly drawn round the waist, will sometimes give relief. In more obstinate cases, aromatic spirit of ammonia, camphor, musk, etc., may be resorted to. A combination of camphor and chloroform, and the frequent swallowing of small rounded pieces of ice, are perhaps the most efficient remedies.

HICKES, GEORGE, D.D., an eminent English divine and philologist, was b. at Newsham, Yorkshire, June 20, 1642. He studied at Oxford, and in 1664 was elected fellow of Lincoln college. In 1665 he passed M.A., and in 1666 was admitted into orders. In 1676 he became chaplain to John, duke of Lauderdale, whom, in 1677, he accompanied to Edinburgh. In 1678 he received the degree of D.D. from the university of Glasgow, and in 1679 from that of Oxford. In 1683 he was appointed one of the king's chaplains, and the following year made dean of Worcester. Refusing at the revolution to take the oaths to king William III., he was deprived of all his benefices. In 1693 he was sent with a list of the nonjuring clergy to the exiled king at St. Germains, and in 1694 was consecrated by a prelate of his own party suffragan bishop of Thetford. His publications in controversial and practical divinity are numerous. His greatest work, entitled *Thesaurus Grammatico-Criticus et Archæologicus Linguarum Veterum Septentrionalium*, appeard at Oxford in 1705, 3 vols. fol. He died Dec. 15, 1715.

HICKMAN, a co. in w. Kentucky, on the Mississippi, intersected by Obion river and the Mobile and Ohio and the New Orleans, St. Louis and Chicago railroads; 220

sq.m.; pop. '70, 8,453—1471 colored. The surface is undulating, and the soil is fertile; chief productions: corn, tobacco, and pork. Co. seat, Clinton.

HICKMAN, a co. in middle Tennessee, intersected by Duck river; 550 sq.m; pop. '70, 9,856—1471 colored. The surface is hilly, and much of it is covered with forests. The soil is fertile; corn, cotton, and pork are the main products. Co. seat, Centerville.

HICKOK, LAURENS PERSEUS, D.D., LL.D., b. in Danbury, Conn., 1798; pastor at Newtown, Kent, and Litchfield, Conn., 1822–36; professor of theology in Western Reserve college, Ohio, 1836–44; professor in Auburn theological seminary, 1844–52; professor of mental and moral science in Union college, and vice-president, 1852–66, and president, 1866–68. Since his resignation of the last-named office he has resided at Amherst, Mass. His published works are: *Science of the Mind; Rational Psychology; Moral Science; Rational Cosmology; Creator and Creation; Humanity Immortal; Logic and Reason.* His philosophical views may be indicated by a brief outline of his *Science of the Mind* and of a part of his *Moral Science:*—SCIENCE OF THE MIND. I. *General facts of the mind:* 1. The fact of its existence. 2. Its existence not phenomenal, or ideal. 3. It has its conscious identity through all changes. 4. It is essentially self-active. II. *Primitive facts of mind:*—1. Sensation. 2. Consciousness. 3. Capacity for knowing, or intellect; for feeling, or susceptibility; for willing, or the will. Intellect comprises sense, understanding, and reason; susceptibility is animal, rational, and spiritual; the will has immanent preferences, governing purposes, and desultory volitions. 4. Man, endowed with these mental capacities, is competent to attain the end of his being. —MORAL SCIENCE. *Pure morality.* I. Duties to mankind: 1. Personal duties. *Self-control.* General maxim: Bear and forbear. Particular maxims: Do yourself no harm; keep under your body; rule your spirit. *Self-culture.* General maxim: Purify and perfect your whole being. Particular maxims: Grow in stature; in practical knowledge; in rational wisdom. 2. Relative duties. *Kindness.* General maxim: Do good unto all men as you have opportunity. Particular maxims: Owe no man anything; give to the poor; be thankful. *Respect.* General maxim: Honor all men. Particular maxims: Be courteous; deal justly; sustain your neighbor's good name; be obedient to government. II. Duties to nature: Do not mar it; use it; adorn and perfect it; explore it; make it a discipline to virtue. III. Duties to God: General maxim: Worship God. Particular virtues: Humility, reverence, godly fear.

HICK'ORY, *Carya*, a genus of trees formerly included among walnuts (*juglans*). The hickories are exclusively North American. They are large and beautiful trees, attaining a height of 70 or 80 ft., with pinnate leaves. The timber of all of them is very heavy, strong, and tenacious, but decays speedily when exposed to heat and moisture, and is said to be peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes. Shafts of carriages, handles of whips and golf-clubs, large screws, etc., are made of it. It is greatly esteemed for fuel. The nuts of some of the species are excellent eating, and much resemble walnuts. *C. alba*, the SHELL-BARK, or SHAG-BARK hickory, so called from its shaggy outer bark peeling off in long narrow plates, yields the common *hickory-nut* of the northern parts of the United States; also known as the *Kisky Thomas nut.* It abounds on lake Erie and in some parts of New Jersey and Pennsylvania. The trunk is slender. The leaves are often 20 in. long. The nuts are in considerable request, and are sometimes exported. The shell is thin but hard, the kernel sweet. An oil, which is used by the Indians as an article of food, is obtained from it by pounding and boiling. *C. sulcata*, the THICK SHELL-BARK hickory, a very similar tree, abounding in the fertile valleys of the Alleghany mountains, has a nut with a thick yellowish shell, which is often brought to market in America, under the names of Springfield nut and Gloucester nut.—*C. olivæformis* yields the PACANE or PECAN NUT, sometimes called the Illinois nut.—Other species yield the MOCKER NUT, PIG NUT, and BITTER NUT.

HICK'ORY, a co. in s.w. Missouri, intersected by Pomme de Terre river; 408 sq.m.; pop. '80, 7,388—50 colored. About half the surface is prairie; the remainder is undulating and mostly covered covered with forests. Productions: corn, wheat, oats, and pork. Co. seat, Hermitage.

HICKS, ELIAS, a celebrated American preacher of the society of Friends, was b. at Hempstead, L. I., Mar. 19, 1748. His gifts were early recognized by the society, and at the age of 27 he had become a well-known preacher, and for many years traveled through the states and Canada. His unitarianism, or denial of the divinity of Christ and a vicarious atonement, brought him into disfavor with orthodox Friends; but he preached his own views with perseverance, and at the age of 80 still traveled and preached. The result of his labors was a schism of the society into two divisions, popularly known as orthodox and Hicksite Quakers. He died at Jericho, L. I., Feb. 27, 1830. See Elias Hicks, *Journal of his Life and Labors* (Philadelphia, 1828).

HICKS, ELIAS (*ante*), very early in his career became known as a strong opponent of slavery, against which he directed some of his most powerful discourses; making in addition personal exertions and sacrifices to protect and encourage emancipated slaves. He was bold and outspoken, and his meetings drew together people of all creeds. The

name of Hicksites, given by way of reproach to the branch of the society of Friends to which he adhered, was never recognized by him. His relations to the society are best given in his own words. He felt himself called upon, under the influence of the love of the gospel, to admonish his brethren to rally to the ancient standard, the light of truth manifested in the heart, and to follow no man any farther than he should be found a follower of Christ. A journal of his religious travels has been published; also, *Observations on Slavery* and *Doctrinal Epistle*. A volume of his sermons has been published since his death.

HICKS, THOMAS, b. Penn., 1823; began to paint portraits when a boy 15 years of age; studied art in New York, and was represented in the exhibition of 1841 by "The Death of Abel." He resided in Europe, 1845–48, chiefly at Rome; then studied in Paris, and returned in 1849 to settle in New York. He is best known as a successful portrait-painter. Among other portraits from his brush are those of Dr. Kane, Longfellow, Margaret Fuller Ossoli, Henry Ward Beecher, Edwin Booth as "Iago," and a large painting of "Contemporaneous Authors of America."

HIDAGE, an extraordinary tax payable to the kings of England for every "hide" of land. This tax was levied in money, provision, armor, and other articles; and when the Danes landed in Sandwich in 994, king Ethelred taxed all his lands by hides, so that every 310 hides found one ship furnished, and every eight hides furnished one jack and one saddle, to arm for the defense of the kingdom. Sometimes the word hidage was used to signify exemption from that tax; and this immunity was also called *hide-gild*, and signified a price or ransom paid to save one's skin.

HIDAL'GO (Spanish; in Portuguese, *Fidalgo;* a word derived by some from *hijo del Goto*, "son of a Goth," implying purity of descent, and by others from *hijo de alguno*, "son of somebody") is the title of a class of the lower nobility in Spain.

HIDALGO, a co. in s.w. Texas, on the Rio Grande; 3,250 sq.m.; pop. '80, 4,347—114 colored. A large part of the soil is sandy, but produces good pasturage; a portion is productive, and with irrigation will yield two crops in a season. Stock-raising is the chief business. Co. seat, Hidalgo.

HIDALGO Y COSTILLA, DON MIGUEL, a South American, b. near the close of the 18th c.; executed in Mexico July 27, 1811. He was a Roman Catholic priest, but so much dissatisfied with the government of Mexico, in which country he had settled, that he conspired with the Indians to produce a general insurrection on Nov. 1, 1810. Fear of discovery led him to hasten his plans, and the revolt began in September among the officers of the garrison at Guanajuato. His eloquence had a powerful effect on the people, and to heighten the enthusiasm he held aloft a figure of Our Lady of Guadalupe, patron saint of Mexico, and gave to his insurrection the character of a crusade. He plundered several cities, and finally proceeded to attack the capital; but an excommunication being issued against him by the archprimate, his followers were inspired with mistrust, and two almost simultaneous defeats culminated in a total rout of all his forces, Jan. 17, 1811. He set out for the United States, to procure assistance, but was captured, degraded from his priestly office, and shot. Some years later he was extolled as a saint.

HIDES. See LEATHER, *ante*.

HI'ERA PI'CRA, or HOLY BITTER, once a highly popular remedy, and still much employed in domestic medicine and in veterinary practice, is composed of four parts of powdered aloes and one part of canella. It is identical with the officinal preparation known as *pulvis aloes cum canella*. The principal objection to its use as a purgative medicine is that the nauseous taste of the aloes is not concealed by the canella; and that, like aloetic preparations generally, it is liable to cause irritation of the lower part of the intestinal canal.

HIERA'CIUM. See HAWKWEED.

HIERAP'OLIS, a city in Phrygia, at the junction of the Lycus and Meander. It possessed warm springs which had and still have a remarkable power of forming incrustations. Its name Hierapolis is due to the sanctity conferred on it by these hot springs and by the Plutonium, a small cave under a projecting rock, from which there constantly emanated a dark vapor deadly to man and beast. In reference to this we sometimes find on its coins Pluto carrying off Proserpine. The water was also much used for dyeing. Nothing is known of the origin of the city; from the legend on coins, with a radiant head of the sun-god, Eckhel concludes that a Greek foundation was made under the guidance of Apollo; but a native city may have already existed there. On the coins of the city occur native names of the sun-god, probably a Phrygian form of the Greek Zeus, the goddess of healthful drinking, Euposia, and Cybele who was one of the chief deities of the place. Little is known of the history of the city. The philosopher Epictetus was born there; and there St. Paul founded a church. The very considerable ruins which still exist, called Pambuk Kalessi ("Cotton Castle"), have been described by Pococke, Leake, etc. The ancient theater and gymnasium are in a state of remarkable preservation.

HIERAPOLIS, a city in Syria, 16 m. s.w. from the junction of the Euphrates and the Sajur. Besides the natural strength of its position, it was important as lying on

the line of intercourse between n. Syria and Mesopotamia, and was always a great trading city. Its early history is quite unknown. It is not mentioned during the Assyrian wars in this part of Syria. Abdul Faráz asserts that Josiah was defeated there by Pharaoh Necho (611 B.C.) on his march towards Carchemish; but according to 2 Chron. xxxv., the battle took place at Megiddo, some distance w. of the Jordan, and probably Abdul Faráz confounded places altogether different. No proof exists that Hierapolis was an important city before the time of the Seleucidæ, and prof. Sayce suggests that it then succeeded to the trade and name of the older city, Bambyce, which had now decayed. The romance of trade by which this name has become naturalized in many European languages deserves a passing notice. As the city lay on the highway to the east, cotton and silk were important branches of its trade. Probably cotton plantations existed there in old time; and after the cultivation of silk was introduced to w. Asia, in the time of the Sassanian kings, large groves of mulberry-trees surrounded the city. In Asia cotton seems to have been recognized as a distinct article of commerce, and was named after the city which was the chief seat of its manufacture, as muslin is from Mosul. By the crusaders the stuff and the name were carried to Europe, and the latter exists in English in the form of "bombazine." The Syrian goddess Atargatis, called by the Greeks Decerto, a personification of the nature power worshiped under different names over the whole of w. Asia, had one of her most famous temples in the city; and perhaps Mambe may have been a local name for the goddess. Hence in the 3d c. B.C., when, under the Seleucid kings, Bambyce became a great Greek city and the most important station between Antioch and Seleucia, it was called Hierapolis or Hieropolis. The latter form is found on coins, the former is used in classical literature. The coinage of Hierapolis begins under the Seleucidæ. The autonomous coins, probably for commercial reasons, imitate closely the coins of Antioch. The temple was plundered by Crassus on his Parthian expedition (53 B.C.). Under Diocletian or Constantine, Hierapolis became the capital of the new province of Euphratensis, a name which soon gave place to the older name Commagene. As paganism decayed, Hierapolis ceased to be the sacred city, and recovered its ancient name; at the same time its importance and population declined. In the time of Julian, who concentrated there the Roman troops for the fatal Parthian campaign, it was still one of the greatest cities of Syria; but under Justinian, who made some attempt to restore it, great part of its area was a desert; and the once strong fortifications were so decayed that the place was not defensible against the Parthian king Chosroes. At the Arab conquest it passed into the hands of the caliphs. Haroun-al-Raschid (786–808) restored it and strengthened its walls, and it is mentioned about 1150 by Edrisi as a strong city. As the empire of the caliphs dwindled, it appeared as Mambedj, a frontier post in the struggle between Christians and Mohammedans, and its possession carried with it the rule in this part of Syria. The emperor Romanus Diogenes captured it in his gallant struggle against the Turks (1068). Recaptured by the Seljuk Turks, it soon afterwards fell into the power of the crusaders, until it was stormed by Saladin (1175). It was for some time the head-quarters of the Mongol host under Hulagu Khan; and, as with many other Syrian cities, its desolation dates from this time. The ruins which still exist, called Kara Bambuche or Buyuk Mambedj, have been described by Pococke and others, and most carefully by Chesney.

HI'ERARCHY (Gr. *hieros*, sacred, and *archo*, to govern), the name used by theological writers to designate the whole sacred governing and ministering body in the church, distributed according to its several gradations. The word, in its strict acceptation, is, of course, only applicable to the Roman Catholic church, and to those Christian communities which retain the prelatical form of church government, or at least the distinctions of ecclesiastical order and gradation. In considering the hierarchy of the Catholic church, it is necessary to bear in mind the well-known distinction of *order* and of *jurisdiction*. I. Considered under the head of *order*, the hierarchy embraces all the various orders or classes of sacred ministers to whom has been assigned the duty of directing the public worship, administering the sacraments, and discharging the various other offices connected with the preaching of the gospel; and these are of two kinds—the orders directly instituted by divine authority, and those established by ecclesiastical ordinance. Theologians commonly distinguish a *hierarchy of divine right*, and a *hierarchy of ecclesiastical right*. (1) The first includes the three ranks of bishops, priests, and deacons. The bishops are believed, as successors of the apostles, to have inherited the integrity of the Christian priesthood. The order of episcopate, however, is not believed to be a distinct order from that of priesthood, but only a fuller and entirely unrestricted form of that order. In all that regards what Catholics believe to be the Christian sacrifice of the eucharist, they hold that the priest possesses the same powers *of order* with the bishop; but he cannot confer the sacrament of orders, nor can he validly exercise the power of absolving in the sacrament of penance without the approbation of the bishop. The office of deacons is to serve as helpmates of the priests and bishops, especially in the administration of the eucharist and baptism, and in the relief of the material as well as the spiritual necessities of the faithful (Acts vi. 1, and foll.). (2) To the three ranks thus primitively instituted, several others have been added by ecclesiastical ordinance. See ORDERS, MINOR.—II. The *hierarchy of jurisdiction* directly regards, and is founded upon, the government of the church, and it comprises not only

all the successive degrees of ecclesiastical authority derived from the greater or less local extension of the several spheres within which such governing authority is limited—beginning with the pope as primate of the universal church, and extending to the patriarchs as ruling their several patriarchates, the primates in the several kingdoms as national churches, and the metropolitans or archbishops within their respective provinces—but also, although less properly, the ecclesiastical grades which, although ecclesiastical jurisdiction may be attached to them, are more directly honorary in their nature, as those of the cardinalate, the archipresbyterate, and the archidiaconate.

In the Anglican church, with the office of the episcopate, the theory of a hierarchical gradation of rank and of authority has been retained. The Anglican hierarchy comprises bishops, priests, and deacons. In the Scottish church it is of course unknown, as it is in the greater number of the foreign Protestant churches; while those Lutheran communities which have retained or have revived the title of bishop concede little to the office which can be considered as imparting to the distinction of grades in the ministry which it imports a strict hierarchical character. The Lutheran bishop has little beyond his brother-ministers, except the right to bear certain insignia, and the first place in the consistories.

In the well-known work, *The Celestial Hierarchy*, falsely ascribed to Dionysius the Areopagite, the hierarchy includes Christ as its head, and the various orders of angels as his ministering spirits.

HIERAT'IC WRITING. See HIEROGLYPHICS.

HIERAX, an ascetic of the 3d c. A.D. in Egypt, where he lived to the age of 90, supporting himself by caligraphy and devoting his leisure to scientific and literary pursuits, especially to the study of the Bible. He was the author of biblical commentaries both in Greek and Coptic, and is said to have composed many hymns. He ultimately became leader of the sect of the Hieracites, an ascetic society from which persons living in the married state were excluded, and of which one of the leading tenets was that only the celibate could enter the kingdom of heaven. This doctrine they based on a literal interpretation of the parable of the ten virgins; on other points, however, Hierax followed Origen in allegorizing Scripture; thus he thought that the narrative of the fall and the doctrine of the resurrection ought both to be taken in a scriptural sense. It is upon this apparently Manichæan view of matrimony, taken with his denial of the resurrection and of a visible paradise, and his assertions that infants, as incapable of "striving lawfully," cannot inherit the kingdom of God, that his reputation as a heretic chiefly depends.

HI'ERO I., King of Syracuse, succeeded his brother Gelon in the year 478 B.C. The most important event of his reign was the naval victory gained by his fleet and that of the Cumani over the Etruscans in 474, which deprived the latter of their supremacy in the Tyrrhenian sea. In the year 472 Thrasidæus, who had meanwhile become tyrant of Agrigentum, was conquered by Hiero. Hiero himself was violent and rapacious, far inferior in character to his brother Gelon. His love of poetry, and the manner in which he entertained poets like Simonides, Æschylus, Bacchylides, and Pindar at his court, have perhaps caused him to be overestimated.

HIERO I. (*ante*), Tyrant of Syracuse, succeeded his brother Gelon, 478 B.C. Hiero had already distinguished himself at Himera. A jealousy arising between him and his brother Polyzelus, who had the command of the army, war was on the point of breaking out between Hiero and Theron of Agrigentum, who had espoused the cause of Polyzelus, when a reconciliation took place between the brothers. Hiero seized Naxos and Catana, transferring the inhabitants to Leontini. Peopling Catana with natives of Syracuse, he changed its name to Ætna. Upon the death of Theron war broke out between Hiero and Thrasydæus, son of Theron, but victory declared in favor of Hiero. His tyrannical measures led him to fear attempts against his life, and he kept up a large body of mercenaries, as well as numerous spies. He deserves credit in two important respects. By his vigorous assistance to the Cumæans the power of the Etruscan pirates was completely destroyed. Besides defeating the pirates, Hiero was the patron of poets and philosophers. He has been immortalized in the *Odes* of Pinder as a successful competitor at the Grecian games.

HIERO II., King of Syracuse (269–214 B.C.), was the son of a noble Syracusan named Hierocles. During the troubles which prevailed in Sicily, after the retreat of king Pyrrhus, 275 B.C., Hiero greatly distinguished himself, and was first appointed commander-in-chief and then elected king. He joined the Carthaginians in besieging Messana, which had surrendered to the Romans, but he was beaten by Appius Claudius the Roman consul, and obliged to retire to Syracuse, where he was soon blockaded. In 263, seeing himself threatened by a large army under Manius Valerius Maximus, he concluded a peace with the Romans for 15 years, during which he proved so faithful to his engagements that in 248 peace was permanently established. Hiero himself visited Rome in 237, on which occasion he presented the Roman people with 200,000 bushels of corn. In the second Punic war he likewise proved himself the faithful ally of the Romans, and supported them with money and troops, especially after their defeat at the lake of Thrasymene, when the golden statues of the goddess of Victory, weighing

320 lbs., which he sent to Rome, were welcomed as a good omen. He died about the year 216, in the 92d year of his age. His son Gelon having died before him, he was succeeded by his grandson Hieronymus. Hiero, by his clemency, wisdom, and simplicity, had gained the affections of the Syracusans, who refused on several occasions to accept his resignation of the kingly office. He devoted great attention to the improvement of agriculture, and his laws respecting the tithe of corn, etc. (*leges Hieronicæ*), were still in force in the country in Cicero's time. He was likewise a patron of the arts, particularly architecture. In these pursuits, as well as in the construction of warlike machines, he was assisted by his friend and relative Archimedes.

HIERO II. (*ante*), King of Syracuse, b. near the end of the 4th c. B.C. For upwards of 40 years Hiero was the steady friend of the Romans. He gave them valuable aid during the first Punic war at the sieges of Agrigentum and Lilybæum. As a reward, the tribute which he formerly paid was remitted, and he was included in the treaty of peace at the close of the first Punic war, 241 B.C. After this he visited Rome, where he displayed great liberality and received signal honors. At the breaking out of the second Punic war he remained equally steady in his friendship with the Romans, whom he assisted with ships and provisions. He is supposed to have died 216 B.C., upwards of 90 years of age. His government was mild and eminently popular. He laid aside the pomp of royalty, and was scarcely distinguishable from a private citizen. The corn laws which he established were so admirable that in subsequent times, when the Romans took possession of Sicily, they were retained.

HIER'OCLES, a common name among the Greeks. The most celebrated of this name was Hierocles, the Neoplatonist, who lived at Alexandria about the middle of the 5th c., and enjoyed a great reputation. He is usually reckoned the author of a commentary on the golden verses of Pythagoras, of which the best edition is that by Warren (Lond. 1742). Of Hierocles's history we know nothing. His most celebrated works are, *On Providence, Fate, and the Harmony between the Divine Government and Man's Free-will;* of which there remain only a few extracts preserved by Photius, and published by Morelli (Paris, 1593 and 1597). Another ethical work of his, *On Justice, Reverence of the Gods, and the Domestic and Social Virtues*, is known to us from a number of extracts in Stobæus. There is also a work called *Asteia* ("a collection of jests and ludicrous stories") attributed to him, but it is now believed to belong to a much later age than that of Hierocles. This and the previous works are contained in Pearson and Needham's Commentary on Pythagoras (Cambridge, 1709).

HIER'OCLES OF BITHYNIA, 284–305 A.D., a Roman proconsul in the reign of Diocletian; is said to have been the instigator of the fierce persecution of the Christians under Galerius Cæsar in 303. He was a man of considerable intellectual culture, and wrote a work in two books, in which he endeavored to persuade Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. This treatise has not come down to our times, and is known to us through Lactantius, and still more through Eusebius, who is the author of a refutation.

HIEROGLYPH'ICS (literally meaning sacred sculptures), a term applied to those representations of natural or artificial objects used to express language, especially those which the ancient Egyptians and Mexicans employed for that purpose. The term *hieroglyph* would, however, be more correctly applied to these figures. The number of those used by the ancient Egyptians was probably about 1000, and by their means they were enabled to express all the ideas required with correctness, clearness, and facility. They consist of representations of celestial bodies, the human form and its parts in various attitudes, animals, fishes, reptiles, works of art and attire, and fantastic forms. These were either engraved in relief, or sunk below the surface on the public monuments and objects of hard materials suited for the glyptic art, or else traced in outline with a reed pen on papyri, wood, slices of stone, and other objects. The scribe, indeed, wrote from a palette or canon, called *pes*, with pens, *kash*, from two little ink-holes in the palette, containing a black ink of animal charcoal, and a red mineral ink. The hieroglyphs on the monuments are sometimes sculptured and plain; at others, decorated with colors, either one simple tone for all the hieroglyphs, which are then called monochrome; or else ornamented with a variety of colors, and then called polychrome; and those painted on coffins and other objects are often first traced out, and then colored in detail. On the papyri and some few inferior materials they are simply sketched in outline, and are called linear hieroglyphs. The hieroglyphs are arranged in perpendicular columns, separated by lines, or in horizontal, or distributed in a sporadic manner in the area of the picture to which they refer. Sometimes all these modes of arrangement are found together. One peculiarity is at once discernible, that all the animals and representations face in the same direction when they are combined into a text; and when mixed up with reliefs and scenes, they usually face in the direction of the figures to which they are attached. When thus arranged, the reliefs and hieroglyphs resemble a MS., every letter of which should also be an illumination, and they produce a gay and agreeable impression on the spectator. They are written very square, the spaces are neatly and carefully packed, so as to leave no naked appearance of background. Generally they are to be read from the direction in which they face, and the lines follow in

the same succession, but many exceptions occur, in which they follow the reverse order, whether written horizontally or vertically, and this at all periods.

The hieroglyphs, in their nature, are divided into two great classes—*ideographs*, or those which represent ideas; and *phonetics*, or those which express sounds. No doubt, at the first commencement of the language, ideographs only were employed; but the earliest known monuments, which ascend to the 3d dynasty above 2,000 years B.C., are filled with phonetic hieroglyphs, showing that at that early period the principle of writing sounds had been completely developed. These hieroglyphs, at the most developed period of the language, comprised about one-third of the texts. The ideographs are divided into two classes—the simple ideographs, or those which express one idea; and the determinatives, which are used to indicate many. In all instances, these ideographs are occasionally found preceded by phonetic groups, which give the sound of the idea they are intended to express in the written language; the simple ideographs being found only preceded by one group; while the determinatives are preceded by many. The pure ideographs are of various classes: first, those representing the object directly; secondly, those metaphorically conveying the required meaning, as a woman beating a tambourine to indicate "joy," in which the action indicates the effect produced; thirdly, that in which the attribute is expressed by the figure of some object possessing it, as a jackal, to indicate "cunning" or "craft;" a flaming censer, to signify "incense." Or the direct action was often represented; as a bird fishing, to express the idea of fishing in general. Such a mode of depicting ideas in detail was only suited for elaborate monuments; and the number of ideographs required to express all ideas would have been so many as to have overwhelmed the memory of the learner, and to have obscured the comprehension of the reader. In order, therefore, to reduce the number of *ideographs*, a certain number of these hieroglyphs were used to express more ideas than one in the principal classes of thought. Thus, a seated man, originally employed to signify man, was applied to all relationships, functions, and offices of men, as *atf*, father; *sen*, brother; *mer*, governor; *hentneter*, priest; *bak*, laborer: the special meaning which it conveyed being shown by the phonetic groups which preceded it. In the same way, all beasts or objects made of leather were expressed by a skin; all precious stones or objects made of the same by a ring; all actions of locomotion by two legs in the act of walking; and all actions in which the arms were used by an arm holding a stick. The number of these signs may be computed at about 175, and they resemble in their use those of the Assyrian cuneiform, in which, although to a more limited extent, the leading classes of thought were determined by a character prefixed to the phonetic group giving the particular idea. Thus, in the Assyrian, all names of men are preceded by a single upright wedge; all countries by three wedges disposed obliquely; and names of horned cattle by a group of five wedges. In the Egyptian system, however, the determinatives are always placed after the phonetic groups, and are more numerous. The Chinese system of writing approaches still more closely to the Egyptian, 242 radicals, as they are called, but really determinatives, being placed after other groups and symbols, which indicate the special idea intended. In this last language, the radicals are generally placed to the left. In the Egyptian hieroglyphs, every word not expressing an abstract idea, as the verb to be, or the grammatical forms, and pronouns, is accompanied by its determinative, and is incomplete without it. The genius of the writing is that the phonetics and ideographs mutually explain each other. Sometimes, indeed, by a kind of redundant pleonasm, the determinatives are placed after the special ideographs, as three rings of metal after a cape used to express gold and silver; three flowers after the lily, to signify lily; and the skin after the goat, to mean goat. The phonetic portion of the hieroglyphs consists, at the best period of writing, of a limited number of signs, about 130, employed as a syllabarium; and although the term alphabet has been often used in speaking of the phonetic hieroglyphs, nothing of the nature of a pure alphabet existed till a later period, when the Phenicians invented a purely alphabetic system, suppressing the vowels, which the Greeks still further improved by reintroducing them into their graphic system, and so brought to perfection the invaluable invention of alphabetic writing, at once concise, compendious, and complete. But the Egyptian hieroglyphs comprise two classes of syllables—those ending with vowels, or the so-called alphabetics, and those ending with consonants; or, in other words, of monosyllables and polysyllables. As the monosyllables enter into the composition of the polysyllabic groups, it is evident that they are older than the biliteral or dissyllabic hieroglyphs. The spoken language seems, in fact, to have originally consisted of monosyllables, which were subsequently enriched by agglomeration, and combined into biliteral and triliteral roots. Several of these monosyllabic words have descended from the ancient language to the Coptic, as *ab*, a lamb; *au*, a cow; *mau*, a lion; *ra*, the sun; *pe*, the heaven. Numerous words of this class may still be traced as the roots of the more ancient language, but it is obvious that only a few of the most manageable could be selected for the combined purposes of sound and writing. In some instances, two or more seem to have been selected for the same sounds, in order to suit the style of writing, horizontal or vertical signs being required for the careful packing of the groups in the texts. Now, it will be necessary to bear in mind that each of these hieroglyphs of the first phonetic division represents a monosyllable; of which it represents the whole by itself considered as the initial, but that it was always capable of having the vowel

hieroglyph which followed the initial placed after it, and that in the hieratic or cursive Egyptian writing this was generally the case in order to distinguish the signs. This final vowel is, however, generally omitted in hieroglyphic texts, and is said to be *inherent*, or ought to be pronounced in the first hieroglyph. The alphabetic syllabarium is as follows:

an eagle, A*a*.
an arm, Â*a*.
a reed, Au.
a calf, Au.
a heron, Ba.
a leg, Bu.
a cerastes, Fi.
an eaglet, Ga.
a vase, Ga.
a viper, Gi.
leg of a stool, Ha.
a house, Ha.
a sieve, KHi.
a garment, KHu, or Au.
a lion, Ru, or Lu.
a mouth, Lu, or Ru.
a pen, Ma.
a weight, Ma.
a hole, Mâ.
an owl, Mu.
a vulture, Mu.
a water-line, Na.
a red crown, Na.
a vase, Nu.
a goose flying, Pa.
a shutter, Pu.
a knee, Qa.

a papyrus plant, Ha.
fore-part of lion, Hâ.
twisted cord, Hi.
a tusk, Hu.
a club, Hu.
two reeds, Iu.
two oblique strokes, Iu
a bowl, Kâ.
leaf of water-lily, KHa.
a mormorus fish, KHa.
a mace, KH*a*.
a stand, Qa.
top of quiver, Sa.
a goose, Sa.
a woof, Sa.
a reed, Su.
a bolt, Su.
back of chair, S(en or -et).
a garden, SHa.
part of dress, SHa.
a pool, SHi.
a spindle, Ta.
a hand, Ti.
twisted cord, Ti.
a muller, Tu.
a duckling, Ui.
a twisted cord, Ui.

This comprises all the signs which may be considered alphabetic in their nature, at the best period, or from the 4th to the 21st dynasty, when a revolution took place in the mode of writing, and about 90 additional signs, taken from the ideographs and syllabics, were added to the preceding alphabetic, and used indiscriminately—not, indeed, all at once, but by gradual introductions, from the 21st dynasty till the 2d c. A.D. Nor are all the signs of the preceding alphabet of equal antiquity, or as much used as others. As to the inherent nature of the vowels, it may be observed that A, the commonest, is often written with its complement *u* after it. Of the three forms of the A, the first expresses the aspirate, the second the nasal, and the third the soft breathing. Besides, too, their final complement, the initial sound, especially of consonants, probably of those newly introduced into the system, was placed before them, to explain their use. The consideration of the signs that precede and follow after indeed determines the sonal value of certain hieroglyphics which are thus encased and explained by other phonetics.

The syllabics are constructed on the same plan. They consist of an initial hieroglyph, which is capable of expressing by itself the whole syllable, but which take after them their inherent consonant or complement, and are sometimes preceded by their initial complement. These are more numerous than the alphabetico-syllabic class, and are as commonly used in the texts. The language had impressed upon it by this mode of writing a certain ideographic character, which it retained, certain words being only written by certain syllabics, and the use of the two syllabaries was by no means promiscuous, the examples of different modes of grouping the same word being abnormal, and referable only to long intervals of time. For although several hundred papyri exist in the museums of Europe, and no two are written precisely alike, yet the greatest differences will be observable in those which are similar texts, written at long intervals of time from each other. Nevertheless some latitude prevails in the writing of certain words and propernames, and those hieroglyphs which appear in the corresponding places of others are called *variants* or *homophones*. Sometimes the same proper name is represented by six different groups of hieroglyphs, yet they could only have been pronounced in one way, as they represent the same name, and the different hieroglyphs are consequently only interchanged to express the same sounds.

The *language* of the hieroglyphs is nearest to the Coptic, the form which it assumed about the 3d c. A.D., when the Greek alphabet, reinforced by letters borrowed from the

demotic or popular cursive hand of the period, superseded the demotic and hieroglyphic mode of writing. This language, extinct only as spoken about a century and a half ago (see COPTIC), differs considerably from the monumental texts, having been corrupted by the introduction of Greek, Latin, and Arabic words, but this contains, as its base, the old language of the country—a tongue analogous in some respects to the Semitic dialects, but in others of a construction which may be called Hamitic, or allied to the African. The great peculiarity of the hieroglyphic language is that the verbal root both of the nouns, adjectives, and verbs remains unchanged, and that the dual and plural are made by postfixes, the cases of the nouns formed by prepositions, and the tenses of the verbs by the prefixing of the declined abstract auxiliary verbs, au, an, or kheper, to be; or by the affixing of the pronouns *a, k, t, f, s, nen, ten, sen*, preceded by prepositions, to the verbal roots. The pronouns are either detached and prefixed or affixed, and the prepositions are either simple or compound; many remarkable forms of the last class existing in the language. There is a great vagueness in their employment, and their meaning is often abnormal, and only defined by the context.

Considered as the most ancient written language, the hieroglyphs throw great light upon comparative philology, the relative antiquity of various words and locutions, the general construction of language itself, and the development of picture-writing into the abstract ciphers of sound, called letters. A great portion of the words are similar to the Semitic, either directly or indirectly: thus *iuma*, the sea, is like the Hebrew *yam; kaf*, an ape, like *qof*. The majority are, of course, purely Coptic; but at the period of the 19th dynasty, or about 1300 B.C., many Hebrew, Syriac, and Aramaic words were introduced into the language by the progress of the Egyptian arms to the east, and such words as *bata* for *beth*, a house, *makaturu* for *migdol*, a tower, and others, appear; they are, however, rare and few in number compared to the body of the language. Many other words appear to be Indo-Germanic. The literature will be found under the word PAPYRUS.

The invention of hieroglyphs, called *neter kharu*, or "divine words," was attributed to the god Thoth, the Egyptian Logos, who is repeatedly called the scribe of the gods, and lord of the hieroglyphs. Pliny attributes their invention to Menon. The literature of the Egyptians was in fact styled hermaic or hermetic, on account of its supposed divine origin, and the knowledge of hieroglyphs was, to a certain extent, a mystery to the ignorant, although universally employed by the sacerdotal and instructed classes. To foreign nations the hieroglyphs always remained so, although Moses is supposed to have been versed in the knowledge of them (*Philo*, vita Moysis); but Joseph is described as conversing with his brethren through interpreters, and does not appear to allude to hieroglyphic writing. The Greeks, who had settled on the coast as early as the 6th c. B.C., do not appear to have possessed more than a colloquial knowledge of the language; and although Solon, 538 B.C., is said to have studied Egyptian doctrines at Sebennytus and Heliopolis, and the doctrines of Pythagoras are thought to have been derived from Egypt, these sages could only have acquired their knowledge from interpretations of hieroglyphic writings. Hecatæus (521 B.C.) and Herodotus (456 B.C.), who visited Egypt in their travels, obtained from similar sources the information they have afforded of the language or monuments of the country. Democritus of Abdera indeed, about the same period (459 B.C.), had described both the Ethiopian hieroglyphs and the Babylonian cuneiform, but his work has disappeared. After the conquest of Egypt by Alexander, the Greek rulers began to pay attention to the language and history of their subjects, and Eratosthenes, the keeper of the museum at Alexandria, and Manetho, the high-priest of Sebennytus, had drawn up accounts of the national chronology and history from hieroglyphic sources. Under the Roman empire, in the reign of Augustus, one Chæremon, the keeper of the library at the Serapæum, had drawn up a dictionary of the hieroglyphs; and both Diodorus and Strabo mention them and describe their nature. Tacitus, later under the empire, gives the account of the monuments of Thebes translated by the Egyptian priests to Germanicus; but after his time the knowledge of them beyond Egypt itself was exceedingly limited, and does not reappear till the 3d and subsequent centuries A.D., when they are mentioned by Ammianus Marcellinus, who cites the translation of one of the obelisks at Rome by one Hermapion, and by Julius Valerius, the author of the apocryphal life of Alexander, who gives that of another. Heliodorus, a novelist who flourished 400 A.D., describes a hieroglyphic letter written by queen Candace (iv. 8). The first positive information on the subject is by Clement of Alexandria (211 A.D.), who mentions the symbolical and phonetic, or, as he calls it, cyriologic nature of hieroglyphics. Porphyry (304 A.D.) divides them also into cœnologic or phonetic, and enigmatic or symbolic. Horapollo or Horus-Apollon, who is supposed to have flourished about 500 A.D., wrote two books explanatory of the hieroglyphs, a rude, ill-assorted confusion of truth and fiction, in which are given the interpretation of many hieroglyphs and their esoteric meaning. After this writer, all knowledge of them disappeared till the revival of letters. At the beginning of the 16th c., 1529 A.D., these symbols first attracted attention, and soon after Kircher, a learned Jesuit, pretended to interpret them by vague esoteric notions derived from his own fancy, on the supposition that the hieroglyphs were ideographic, a theory which barred all progress, and was held in its full extent by the learned, till Zoega, at the close of the 18th c., 1787 A.D., first

enunciated that the ovals or cartouches contained royal names, and that the hieroglyphs, or some of them, were used to express sounds. More monuments were known, and juster ideas had begun to dawn on the European mind; and the discovery by the French, in 1799, of the so-called Rosetta stone, a slab of black granite having inscribed upon it, first in hieroglyphics, secondly in demotic or enchorial (a cursive popular form of writing extant at the period), and thirdly in Greek, a decree of the priests of Egypt assembled in synod at Memphis in honor of Ptolemy V., gave the first clue to the decipherment. The first attempts, indeed, were made upon the demotic text by Silvestre de Sacy with some success, but it was soon discovered that the demotic was not purely alphabetic. Crude notions of the ideographic nature of the hieroglyphs prevailed till Dr. Young, in 1818, first gave out the hypothesis that the hieroglyphs were used as sounds in royal proper names. He was led to this conclusion by tracing the hieroglyphs through the cursive hieratic to the more cursive demotic; and as this last was known to be alphabetic, he deduced that the corresponding hieroglyphic signs were so. In this manner, he came to the conclusion that the first hieroglyph in the name of Ptolemy in the Rosetta stone (a mat) represented a P; the second (hemisphere) a T; the third (a loop) he supposed to be superfluous; the fourth (a lion) he read OLE; the fifth and sixth, the syllable MI; and seventh, the back of the seat, an S. Unaided by bilingual monuments, he essayed to decipher the name of Berenice, and altogether established the value of five hieroglyphs as letters out of two names, but was unable to proceed further. Champollion, in 1822, by means of an inscription found on an obelisk at Philæ, which had at the base a Greek inscription, recognized the name of Cleopatra, and by comparison with that of Ptolemy at once proved the purely alphabetic, not syllabico-alphabetic, nature of the signs. Extending the principle, he read by its means the names of the Greek and Roman and finally those of the native monarchs. It was soon seen that the same hieroglyphs as those used in these names were extensively used in the texts for words, and these words turned out, in most instances, to be analogous to the Coptic. Although the discoveries of Champollion were received by many of the learned in Europe with distrust, yet his method of research was slowly adopted by Rosellini and Salvolini in 1832, and subsequently extended methodically by Lepsius in 1837, and by Bunsen, Hincks, De Rougé, Birch, Goodwin, Chabas, Brugsch, and others.

The method of interpretation adopted has been strictly inductive, the value of the characters being deduced from the equation of sounds, or homophones of similar groups. The meaning of the groups or words has been determined by examining all known instances in which they occur in passages capable of being interpreted, that of the ideographs by observing the form of the symbols; many of them have been made out from the pictures which they explain, or the phonetic groups which accompany them. A careful comparison has been instituted with corresponding Coptic and Hebrew roots when they exist. In short, a careful principle of induction has been applied to the study of the hieroglyphs.

The discovery of another trilingual inscription, that of the tablet at San or Tunis, recording a synodical act of the priests in the reign of Ptolemy Euergetes II., B.C. 238, has confirmed the results obtained by Egyptologists, the meaning of almost all the words having been previously determined; while the power of reading all documents and inscriptions afforded by their researches has resulted in the resuscitation of a knowledge of the history, science, and literature of the ancient Egyptians. The study has long passed into the category of a recognized branch of oriental learning, and the researches have assumed a more critical form. This has been owing to the number of students and the abundance of material extant and published. The doubts with which the interpretations were at first received have succumbed to the conviction that nothing but a current system of interpretation could have obtained such logical results. Whatever doubt, in fact, may exist as to the minor details and more delicate shades of language, all the grammatical forms and three-fourths of the words of the old Egyptian language have been established.

The hieroglyphs stood in the same relation to the other two forms of writing the character, called hieratic and demotic, as type does to handwriting. Their use was chiefly for official inscriptions on public or private monuments, religious formulæ, and prayers, and rituals or hermetic books (see PAPYRUS). The most remarkable hieroglyphic inscriptions are: that of Una, recording the conquest of the lands of the negroes at the time of the 6th dynasty; in honor of Khnumhetp at Benihassan, recording the investment of his family; the campaigns of Ahmes against the Hykshos at El-Kab; the annals of Thothmes III. at Karnak, the campaign of Rameses II. against the Khita, and the treaty with them; the account of the tank for gold-washings in the reign of Seti I. and Rameses II. at Kouban and Redesieh; the invasion of Egypt in the reign of Meneptah by the allied forces of the Libyans, Maxyes, Achaioi or Greeks, Sicilians, Etruscans, Lycians, and other people of the basin of the Mediterranean; the star-risings on the tomb of Rameses V.; the journey of the ark of Khons to Bakhtan, in the reign of Rameses X.; the account of Cambyses and Darius on the statue of the Vatican; the already-cited synodical act of the priests in honor of Ptolemy Euergetes II., and that of the priests assembled at Memphis on the Rosetta stone in the reign of Ptolemy V., the sepulchral tablets of the family of Pasherenptah, and the long series of sepulchral

tablets of the bull Apis found in the Serapeion, recording the birth, installation, and death of the bulls from the 18th dynasty to the Persians.

In connection with the hieroglyphics are two modes of writing them, first the *hieratic* writing, consisting of a kind of abridged hieroglyphs. The number of these written characters is fewer than that of the hieroglyphs, the generic determinatives being more employed, and the vocalic complements of the consonants being constantly written, in order to distinguish similar forms. This writing was more extensively used than the hieroglyphic, being employed for state papers, legal documents, memoranda, accounts, religious books, rituals, and all the purposes of private and public life. Books were generally written in hieratic. It commences as early as the 4th or 5th dynasty, and terminates only about the 3d or 4th c. of our era. At the earliest period, it is occasionally written perpendicularly, but it was afterwards only written horizontally, and has generally portions in red ink, corresponding to our initial illuminated letters or rubrics. For the literary contents of these rolls, see PAPYRUS. Some, indeed, have supposed that the hieratic alphabet gave rise to the Phenician, and have endeavored to trace the Phenician alphabet from hieratic sources. But although much ingenuity has been expended in this inquiry, the precise source of Phenician writing remains involved in obscurity, the principal fact being that a syllabary existed long prior to the Phenician alphabet, which did not reach the perfection of the Greeks, owing to the suppression of vowels. The second kind of hieroglyphic handwriting was the *demotic*, or so-called enchorial. It was a still further reduction of the hieratic, simpler forms being used, while the complements are not used, and it approaches still nearer the alphabetic system. It contains an alphabet of 42 letters and a syllabary of 48 characters, and is less rich in the number of determinatives and ideographs than the hieratic. It is, like all cursive hands, more difficult to decipher than the hieratic. It was introduced into the Egyptian graphic system about the commencement of the 26th dynasty, or the 6th c. B.C., and continued in use till the 3d c. A.D. This was the last native form of writing in Egypt, the early Christians having introduced the Greek alphabet, with a few characters borrowed from the demotic. This script is rarely used for public monuments, although it appears on the Rosetta stone; but it was universally employed for contracts, public documents, and occasionally for religious formulæ, owing to the decreasing knowledge of hieroglyphics. At the time of Clement, it was the first learned by beginners. With it the Greek language began to appear in public use.

Besides the Egyptian hieroglyphics there are those of the Aztecs or Mexican, which were a kind of pure picture-writing, the names of monarchs, towns, and other things being painted by the objects which corresponded to their names. While in their historical writings the events themselves were portrayed, the number of the years of the reign of the king was indicated by placing in a line *en potence* in the picture the symbols of the years of the Aztec cycle, which were named after plants and animals. The Mexican hieroglyphs, in fact, consisted of conventional pictures, and they had no means of expressing grammatical form or any structural parts of a language. This mode of pure picture-writing prevailed not only in Mexico, but amongst the nations of Central America. The knowledge of these symbols has unfortunately been almost lost since the Spanish conquest, the meaning of only a few having been rescued from oblivion in the 16th c., when the greater part of the Aztec MSS. was destroyed by the Spanish ecclesiastics. It has indeed been asserted that the monks used these symbols, according to their *sounds*, to write the Lord's prayer and other formulas; thus a flag, pronounced *pantli*, was used for the syllable *pa;* a stone, *tetl*, for *tĕ*, the two expressing *pater;* a cactus-fruit, *nochtli*, for *noch;* and a stone, as above, for *te:* these four groups expressing *pate*(r) *nochte*, or *noster;* and so forth. This seems to show the development of a phonetic system, but it was never extensively used on account of the abhorrence entertained of the Aztec idolatry.—The term hieroglyphic was also used by the writers of emblemata or devices, symbolizing gnomic sentences taken from the Greek and Latin poets, and having no relation to Egyptian hieroglyphs.—In recent times, too, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs.—Zoega, *De Origine Obeliscorum* (fo. Romæ, 1797); Young, *Archæologia* (1817, vol. xvii. p. 60); *Encyclop. Britannica* (8th ed.); Champollion, *Précis du Système Hieroglyphique* (1824); *Grammaire Egyptienne* (1841–61); *Dictionnaire* (1841); Lepsius, in the *Ann. dell' Instituto Arch.* (1828); Birch, *Introduction to the Study of the Hieroglyphics* (1857); Brugsch, *Grammaire Démotique* (Berl. 1855), *Wörterbuch* (1867–68), *Grammatik* (1872); De Rougé, *Étude d'une Stèle Égyptienne* (1858); Chabas, *Papyrus Magique d'Harris* (1861); *Zeitschrift. f. ägypt. Sprache* (1863–74); Bunsen, *Egypt's Place* (vol. v. 1867).

HIERON'YMITES, one of the many hermit orders (q.v.) established in the course of the 13th and 14th centuries. The Hieronymites grew out of the third order of St. Francis. See FRANCISCANS. Some of the followers of Thomas of Siena, one of the Franciscan rigorists, having established themselves in various places among the wild districts which skirt the Sierra Morena, by degrees formed into a community, and obtained in 1374 the approval of pope Gregory XI., who confirmed their rule, which was founded on that of St. Augustine. The institute extended into other provinces of Spain, and also into Portugal; it was subsequently established in Italy, Tyrol, and Bavaria.

HIERONYMUS, King of Syracuse, grandson of Hiero II., succeeded to his grandfather at the age of 15, 216 B.C. Up to this time a close friendship had subsisted between the Romans and Syracusans. But the battle of Cannæ, in which the Romans were so terribly defeated, disposed many of the Syracusans to join the Carthaginians. Hiero II. had appointed 15 guardians, including Andranodorus and Zoippus, to guide the young prince, but through the intrigues of Andranodorus, who was favorable to the Carthaginians, the guardians were all induced to resign their office. The young prince was now entirely under the influence of Andranodorus and Zoippus, who were sons-in-law to Hiero II. Communications were at once opened up with Hannibal. The Carthaginian envoys were received with great favor, whereas the Roman envoys were treated with contumely. Hieronymus was preparing to take the field against the Romans with 15,000 men, when he was assassinated in Leontini by conspirators under Deinomenes. His short reign of one year and one month was disgraced by indulgence in luxury, debauchery, and cruelty.

HIERONYMUS. See JEROME, *ante*.

HIEROPHANT, or MYS'TAGOGUE, the priest who presided over the mysteries at Eleusis, was always selected from the family of Eumolpus, who was regarded as their founder, and the first hierophant. The hierophant was required to be a man of ripe years, without any physical defect, endowed with a fine voice, and of spotless character. He was forbidden to marry, but it is not improbable that married men were likewise appointed hierophants, and were merely prohibited from forming a second marriage. In the mysteries the hierophant represented the demiurge or creator of the universe. He alone was authorized to preserve and explain the unwritten laws, to introduce candidates into the temple at Eleusis, and gradually initiate them into the lesser and greater mysteries. On this account, he was likewise styled *mystagogue* and *prophet*, and no one was allowed to utter his name in the presence of an uninitiated person. At public solemnities he carried the image of the goddess splendidly attired.

HIESTER, JOSEPH, 1752–1832; b. Penn.; a merchant. In the war of the revolution he raised, armed, and led a volunteer company. He was wounded in the battle of Long Island, captured and confined on board the prison-ship *Jersey*. He was in congress for 14 years, and in 1821–23 was governor of his state.

HIGGINSON, FRANCIS, 1588–1630; b. England; educated at Cambridge, and was a rector in Leicester, but was deprived of his benefice for non-conformity. Arriving at Salem, Mass., in 1629, he became teacher of the congregation at that place. He wrote *New England's Plantation, or a Short and True Description of the Commodities and Discommodities of the Country*, and also an account of his voyage.

HIGGINSON, JOHN, 1616–1708; son of Francis, b. England. He accompanied his father to Massachusetts, and settled as a preacher in Guilford, Conn. In 1660 he was pastor of the First church in Salem, and passed the remainder of his life there. He was 72 years in the ministry.

HIGGINSON, THOMAS WENTWORTH, b. Mass., 1823; a descendant of Francis Higginson, graduated at Harvard college in 1841, and at the divinity school in Cambridge in 1847; after which he became the minister of the "First religious society" in Newburyport. His antislavery principles offended a part of his congregation, causing him to resign in 1850. Two years later he became minister of a "free church" in Worcester. He was the leader of the men who in 1853 attempted to effect the rescue of Anthony Burns, a fugitive slave confined in the court-house in Boston, in custody of the U. S. marshal. The attempt was unsuccessful, and he was wounded in the face by a saber cut. One of the marshal's men having been killed in the fray, Mr. Higginson was indicted for murder, but not convicted. In 1856 he went to Kansas and took an active part in the measures by which that state was prevented from becoming an abode of slavery. He now relinquished the ministry to devote himself to literature, but on the breaking out of the war of the rebellion he exerted himself to procure enlistments, and entered the service with the rank of capt. In 1862 he was appointed col. of the first regiment of South Carolina volunteers, the first regiment of emancipated slaves that entered the service. He led this regiment for two years, making various expeditions within the confederate lines, and capturing Jacksonville, Fla. In Aug., 1863, he was wounded, and in 1864 was compelled on that account to retire from the service. He then took up his residence at Newport, R. I., and resumed the literary labors which had been interrupted by the war. Since that time he has published *Outdoor Papers; Harvard Memorial Biographies; Malbone, an Oldport Romance; Army Life in a Black Regiment; Atlantic Essays; Oldport Days;* and a new translation of Epictetus. In 1878 he removed to Cambridge, Mass., where he still resides. He represented that city in the general court in 1880. He has been for many years a very earnest advocate of woman suffrage.

HIGH ALTAR. See ALTAR.

HIGH BAILIFF, is a term applied to some officers in England, who discharge ministerial duties, such as serving writs, etc., in certain liberties or franchises, exempt from the ordinary supervision of the sheriff. The term is used in contradistinction to the

ordinary name of bailiff, which is now almost a term of reproach, and confined chiefly to the lowest class of officers, who execute writs against debtors.

HIGH COMMISSION COURT, a tyrannical court established by queen Elizabeth to reform the church, abolished by 16 Ch. I. c. 11.

HIGH CONSTABLE. See CONSTABLE.

HIGH GATE, a northern suburb of London, in the county of Middlesex, and a station on the Highgate and Edgeware railway, 5 m. n.n.w. of St. Paul's. It comprises many elegant villas, and some important benevolent institutions. On the slope of a hill below the church of Highgate is the North London cemetery. New buildings for the Highgate grammar-school were erected in 1867.

HIGHLAND, a co. in s.w. Ohio, on the Marietta and Cincinnati railroad; 475 sq.m.; pop. '70, 29,133. The surface is generally level, and to a large extent covered with timber. The soil is fertile; main products: corn, wheat, oats, and pork. Co. seat, Hillsborough.

HIGHLAND, a co. in w. Virginia, bordering on West Virginia, watered by affluents of the Potomac; 450 sq.m.; pop. '70, 4,151—348 colored. Surface rough, being invaded by a range of the Alleghany mountains. The valleys are fertile, producing corn, wheat, etc. Co. seat, Monterey.

HIGHLAND REGIMENTS. The origin of the first of these regiments, the 42d, has been given under the head black watch (q.v.). The valuable services of this regiment encouraged the government to augment the force; and accordingly seven other Highland regiments have been raised from time to time—viz., the 71st, in 1777; the 72d, or Duke of Albany's Own, in the same year; the 74th, in 1787; the 78th, or Ross-shire Buffs, in 1793; the 79th, or Cameron Highlanders, in 1805; the 92d, or Gordon Highlanders, in 1796; and the 93d, or Sutherland Highlanders, in 1800. The uniform of each of these corps is the Highland dress, including a distinctive tartan. The soldier wears a coatee of scarlet, a kilt (in most, but not all, of the regiments), a plaid across the shoulders, a plume, and the other attributes of the Gaelic costume. In an army where officers are appointed by general competition, nationality is necessarily disregarded; but these corps are those in which Scotch gentlemen most frequently seek appointments, and a large proportion of the officers are Scotch. Of the men, about 79 per cent are Scotch, 11 per cent English, and 10 per cent Irish. The regiments are recruited at Stirling, Aberdeen, Perth, fort George, and Lanark.—See *History of the Highland Clans* (Fullarton).

HIGH LANDS, a term generally applied to the higher parts of a country, as, for example, Highlands of the Hudson, as defining a certain high and picturesque region on the river Hudson, in the state of New York; but the term has a more special application to a particular district in Scotland. This district has no political or civil boundary. Separated by only a vague line of demarkation from the division called the Lowlands, the Scottish Highlands may be briefly described as that portion of the n. and n.w. of Scotland in which the Celtic language and manners have less or more lingered until modern times. The Highland line, as it is usually called, extends diagonally across the country from Nairn on the Moray firth to Dumbarton on the Clyde; but the mountainous part of the counties of Banff, Moray, Aberdeen, Kincardine, and Perth are also understood to be included in the designation Highlands. Caithness might be excluded as being a generally level country; but throughout the Highlands there are rich level tracts, none being more so than the eastern division of Ross-shire. The Hebrides (q.v.) or Western isles are included in the Highlands, but the isles of Orkney and Shetland, though to the n., are distinctly excluded, by reason of the Norwegian origin of the inhabitants.

The Highlands are full of lofty hills, some green and pastoral with tracts of heath, and others rugged and bare, varying in height from 1000 to 4,000 ft., and having generally narrow valleys between, or else lakes and arms of the sea, called *lochs*. Besides the grander features, there are impetuous mountain torrents, picturesque ravines, and valleys or glens, in which, and on the sides of the hills, are seen the huts of the aborigines. Perhaps the most remarkable feature in the country is the line of valleys from Inverness to fort William, in which lies a series of navigable lochs, united by artificial channels to form the Caledonian canal. Growing up under a system of clanship, the state of society in the Highlands was antiquated and unsatisfactory, in a national point of view; while the country was almost impenetrable to travelers, or to any species of traffic. The first great attempt to reform this state of affairs was the opening up of the country by roads in different directions, under the superintendence of gen. Wade, about 1725–26. The next great act of melioration was the abolition of heritable jurisdictions (q.v.), including the ancient privileges of the heads of clans, about 1748. And lastly, not to speak of the planting of schools and churches, much was done by the establishment of the Highland and agricultural society in 1784. Since these events, the ancient patriarchal system has given place to improvements as regards communications, agriculture, dwellings, education, and other modern conditions, including a gradual substitution of English for the Gaelic language. Latterly, there has been a keen spirit of progress in the Highlands. Great numbers of the Celtic inhabitants, who had little chance of improving their circumstances on the spot, have been dispossessed, and their

place taken by stock-farmers with capital from the Lowlands. See SUTHERLAND. While a new character has thus been given to extensive Highland pasturages, the value of estates has been further and very remarkably advanced by being let for the pursuit of game to sportsmen, chiefly persons of rank and opulence from England. What, therefore, with improved farming and shootings, Highland estates have of late years risen immensely in value. Inverness is usually spoken of as the capital of the Highlands, and is noticed under its proper head. The Highland counties are also noticed individually. There are sundry popular guide-books for tourists in the Highlands; and for minute topographical and other details, we may refer to the *Guide to the Highlands and Islands of Scotland*, by G. and P. Anderson, Lond. 1834; 4th ed. 1863.

HIGHLANDS OF THE HUDSON, a range of hills and mountains, seemingly a continuation of the Blue Ridge of Virginia, connecting with and including the Palisades, appearing e. of the Hudson river in the vicinity of West Point, and extending with gradually lessening elevations to the Green mountains of Vermont. In their course there may be found much splendid scenery.

HIGH MISDEMEANOR, an offense short of, but closely bordering on, treason.

HIGHNESS, a title of honor given to princes. The titles "your highness" and "your grace" were both used in England in former times in addressing the sovereign, but were supplanted by "your majesty" towards the end of the reign of Henry VIII. The children of royal personages are addressed "your royal highness;" those of emperors, "your imperial highness." The sultan of Turkey is addressed as "your highness."

HIGH PLACES (Heb. *bamoth*), the name given in Scripture to certain places where illicit worship was performed by the people of Israel. The practice of erecting altars on elevated situations was common in ancient times, and originated in the belief that hill-tops were nearer heaven, and, therefore, the most favorable places for prayer and incense. The fathers of the Jewish nation acted in this respect just like their neighbors. Abraham, we are told, built an altar to the Lord on a mountain near Bethel. The Mosaic law, however, true to its grand aim of securing national strength and purity by a vigorous system of isolation, prohibited the practice for the future, on the ground that the spots which the Israelites would be compelled to choose had been already polluted by idolatrous services. In spite of the vehemence with which the high places are again and again denounced in the Pentateuch, the prohibition seems to have been a long time in producing the desired effect—if, indeed, it ever really accomplished it. During the whole eventful period of the judges, it was not only practically obsolete, but we actually find that both Gideon and Manoah built altars on high places by divine command (Judges, vi. 25, 26; xiii. 16–23. It also occasions much surprise to read of the violations of the injunction —among others by Samuel at Mizpeh and Bethlehem, by Saul at Gilgal, by David, by Elijah on Mt. Carmel. The explanations given by the rabbis of these contradictions between the conduct of the prophets and kings of the Hebrew people, and the commands of their great lawgiver, are too absurd for mention. Whatever may be the true explanation, it is quite certain that worship in high places was almost universal in Judea, both during and after the time of Solomon. The results were such as might have been anticipated. The people erected altars not only to Jehovah but to Baal, and from worshiping in idolatrous places, proceeded to worship idols themselves. At a later period (see books of Kings and Chronicles) a series of vigorous efforts was made by the more pious monarchs to suppress the practice, and after the time of Josiah, it seems to have been finally abandoned.

HIGH-PRIEST (Heb. *kohen haggadol*, or emphat. *kohen*, Gr. *archiereus*, Lat. *primus pontifex*, etc.), the chief of the Jewish priesthood. His dignity was hereditary in the line of Eleazar, the son of Aaron, and many more restrictions attached to it than belonged to the ordinary office of a priest. He was only allowed to marry an intact virgin, and one of his own tribe; every impure contact even of the dead bodies of his own parents he was strictly forbidden, besides having to abstain from many other things that might cause any defilement whatever. His functions consisted principally in the general administration of the sanctuary and all that belonged to the sacred service. He alone was allowed to enter the holy of holies on the day of atonement, and to consult the urim and thummim (q.v.). No less was his costume of surpassing costliness and splendor, comprising numerous vestments in addition to those of the ordinary priests. This brilliant costume, however, was laid aside by the high-priest when, on the day of atonement, he went to perform the most awful service in the holy of holies: a simple garb of white linen—the funeral dress of the Jews in later times—was all he wore on that occasion. The revenues of the high-priest were in the main the same as those of the other priests; but, according to the Talmud, he was to be richer than these, and if his own means were insufficient, he was to be provided with opulent means by his brethren, in virtue of his exalted position: the other priests never addressed the high-priest but by *ishi kohen gadol*, "my lord high-priest." Before the law, however, the high-priest was equal to any other Israelite. It is doubtful at what time the office of *sagan*, or vice-high-priest, was created. The Talmud, moreover, speaks of a

mashiach milhamah, "anointed for the war," an officer who seems to have shared almost the dignity of the high-priest, and whose special duty it appears to have been to read the proclamation prescribed in Deut. xx. 3, in the time of war, and who may have accompanied the troops for the purposes of celebrating the service in the camp. For further historical and theological points connected with this subject, see PRIESTS, AARON, and JEWS.

HIGH SEAS, i.e., the open sea, including the whole extent of sea so far as it is not the exclusive property of any particular country. The rule of international law is that every country bordering on the sea has the exclusive sovereignty over such sea to the extent of three miles from its shore; but all beyond, and which is not within three miles of some other country, is open or common to all countries. The part of sea within three miles' distance is generally called the territorial sea of the particular country, or *mare clausum*. The distinction has little effect on the right of navigation, but as regards fishing it is otherwise. Thus, for example, foreign fishermen have no right to fish within three miles of the British coast without a license from the crown, or unless some special treaty—as, for example, the French and English treaty—has laid down other arrangements.

HIGH STEWARD, a judge now always a legal peer, who is specially appointed by the crown for the trial of peers indicted for treason or felony. He is a kind of speaker or chairman of the peers, and votes with the rest. It is one of the privileges of the British peerage to be tried by the court of the high steward.

HIGH TREASON. See TREASON.

HIGHWAY, in English law, is the place over which a right is enjoyed by the public, of walking, driving, or riding. It is often called the queen's highway; not because the queen has any greater or better right than any of the public, but to denote the impartiality and equality with which all the subjects enjoy the right of way without distinction. Highways are distinguished into several kinds. 1. A footway, where the public have no right except to walk on foot; 2. A foot and horse way, where the public have the right of walking or riding on horseback; 3. A pack, and drift way—a way used for driving cattle and pack-horses; 4. A foot, horse, and cart way, where the public can walk or ride, or use vehicles of all ordinary descriptions. Navigable rivers are also called highways, but this is rather in a figurative sense. Where the right of way belongs not to the public generally, but to the owner of one or two houses and their tenants, this is called a private way, and is classed among easements.

It has often been disputed, and cannot be said to be yet thoroughly settled, whether a highway must be a thoroughfare—in other words, whether a road which does not lead to any public place can be a highway. The preponderance of authority seems rather to be in favor of the proposition, that it is essential that the highway be a thoroughfare. The mode in which a road is created is by dedication, or by grant of the owner, or by the necessity of things or act of parliament. Thus if a person allow the public for four or five years to pass through his fields without stopping them, this will be evidence from which a jury may infer that the owner meant to make a present to the public of the right of way, and he cannot afterwards exclude the public, for the maxim holds, "once a highway, always a highway." The mode in which a grant of the way is proved, is generally by showing that the public have, from time immemorial, or for a few years without interruption, and with the owner's consent, enjoyed the right of way; for if that is proved, then the law presumes that the right was given by some lost grant. There are also rights of way limited to a particular purpose, which may be proved by immemorial custom, as a way for the inhabitants of a village to or from the parish church. One of the incidents of a highway is, that if it is foundrous, or out of repair, the passenger is entitled to go over the adjacent land, whoever may be the owner of it, so as to avoid the foundrous part of the road. Another incident of the use of a highway is, that if any obstruction is placed upon it, whether in the nature of a gate, or a wall, or even if a house be built too near so as to encroach on the highway, any passenger has a right to abate the nuisance—i.e., he may himself, without any ceremony, remove the obstruction or demolish the wall, but he must take care not to do more damage than is necessary for the purpose of clearing the road, otherwise he will subject himself to an action. Another incident of the use of a highway is, that the public have an absolute right to use every part of it, and to pass to and fro in all directions. Of course, each must comply with certain well-known rules, such as that of giving and taking the road, otherwise, if an accident were to occur, he would be liable for the negligence, if it arose from a neglect of such rules, for these constitute, as it were, the law of the road. It results from this principle, that no person, or body of persons, is entitled to convert part of the highway into any purpose, however useful, other than a highway. Thus in London, and other parts of the country, some vestries and surveyors presumed to give leave to a contractor to lay down a tramway in the streets, which was alleged to be a great public improvement; nevertheless, as it practically resulted in giving a monopoly to some persons, and moreover was an obstruction to others, this was held to be a nuisance, and the parties who took part in it were indicted for the obstruction. And on the same principle, it has been held an indictable nuisance for an electric telegraph company to place their telegraph posts on the strips of land at the side of the road; for

though it might be thought for the benefit of the public, instead of the reverse, yet as it practically obstructed the public in the free passage from every part of the highway to every other, it was held to be a nuisance. Nothing but an act of parliament can legalize such uses of a highway, and no person or body now existing has authority to restrict the free use of the queen's highway in such a manner.

The soil of the highway, or rather the right to the ground beneath the highway, is presumed to be (not, as it is said to be in Scotland, in the crown, but) in the adjoining owners. Thus, if the land on both sides of a highway belong to the same owner, then the right to the ground beneath the road belongs to him also; and if the land on one side belongs to a different owner from the land on the other side, then each is presumed to have the right to the ground under the highway up to the middle line. This rule is more than a mere theory, for though neither of the adjoining owners can ever interfere with the passage of the public, who have an absolute right forever to use it for every lawful purpose of transit, yet the adjoining owner has all the rights incidental to the property which do not interfere with this public right of passage. Thus, if a mine were discovered under the road, the adjoining owner would have the sole right to dig it and keep the contents; all that he would require to attend to would be, to leave sufficient support to the surface of the road. So, in like manner, where there are strips of land at the side of the road on which trees or grass grow, these belong solely to the adjoining owner, and the public have no right to their use. Another remarkable consequence follows, that if, for example, a gas company or a water company were to presume to take up the highway in order to lay their pipes under the surface, this is not only an indictable nuisance as regards the public, inasmuch as it obstructs the use of the road for the time being, but it subjects the company to an action of trespass at the suit of the adjacent owner, whose property consists of all that lies under the surface of the highway. Another consequence of the same rule is, that if a person is loitering on a highway, not with the intention of using it *qua* highway, but for the purpose of poaching at night, the courts have held that he may be punished under the night-poaching act, for trespassing on the land of the adjoining owners in search of game.

The repair of a highway, in general, is a burden which falls upon the occupiers of the lands in the parish. Probably the reason is, that they use those highways most, and somebody or other must keep them in repair. Sometimes, however, the burden of repair is fixed on the owner of the adjoining land, if it can be proved that he has always, from time immemorial, been in the habit of repairing, it being then presumed there was some good reason for this. The general rule is, however, that the inhabitants of the parish must repair the highways within the parish; and so indelible is this obligation, that no agreement they can enter into will relieve them of such a liability. But though bound to repair, they cannot be called on to widen the road. The common remedy, accordingly, when a road is out of repair, is to indict the parish, when, if guilty, the surveyor will be bound to make a rate, and pay the expenses.

Owing to the defects of the common law, which did not sufficiently give power to widen, shut up, and improve highways, so as to keep pace with the wants of the time, a general act of parliament was passed in 1835, called the general highway act, 5 and 6 Will. IV. c. 50, which still regulates the subject. Many minute details are laid down by this act, but substantially the foregoing principles of the common law still govern the subject, the chief alterations being merely in the machinery by which these principles are carried out. The highways are kept in repair by a highway-rate, levied by the surveyor, a person annually appointed by the ratepayers in each parish, and who is vested with the control of the surface of the highway to a limited extent for the purpose of keeping it in due order; so that practically each parish manages its own highways—a state of things which the legislature has to some extent remedied by acts of 1862 and 1864, etc., enabling the justices at quarter sessions to form several parishes into one district, and so enforce more uniformity in the management of the roads. Certain specific uses, or rather abuses, of the highway are also made more promptly punishable by the first statute, such as horsemen riding on footpaths, the tethering of cattle on the sides of the highway, playing at games, baiting bulls, lighting fires, firing off squibs, depositing materials, etc., on the highway.

When any party obstructs, or creates a nuisance on the highway, the proper remedy against him is to indict him for the nuisance; or if any individual has been specially injured by his misconduct, such individual may also bring an action against the party who caused the obstruction.

Many highways are called *turnpikes*, from the fact of their having toll-gates, bars, or turns across them, and are managed by commissioners or trustees. This is always done by some local act of parliament. Where a new road is considered to be of great public benefit, the neighboring proprietors obtain an act of parliament to make it, with powers to take compulsorily the requisite land, and to raise money for the purpose of buying such land, as well as to keep up the road thereafter; and as a means of paying off all this expense, to erect a toll-gate, and levy a tax or toll on all who use the road. This is the history of all these turnpike-roads, the only way of paying the cost of making them being by levying this toll. Several general acts have also been passed to regulate the management of these turnpikes. Sometimes the soil of the turnpike-road is vested in

these trustees. These turnpike-roads were violently opposed at first, the toll being unpopular, but they existed prior to the first general turnpike act, 13 Geo. III. c. 84. The present general turnpike act is 3 Geo. IV. c. 126, but other statutes have passed subsequently. In some cases, part of the highway-rate is ordered to be applied towards keeping up turnpikes, for the parish is bound to repair these roads as well as general highways. Several exemptions from paying toll are created in favor of farmers sending manure, hay, straw, etc., from one part of the farm to another, persons going to or from the parish church, or a funeral, or clergymen going to their church on duty, etc. So persons are exempt who do not pass above 100 yards along the road. All tolls chargeable must be stated in a table of tolls set up at the toll-house.

In the law of Scotland, highway is substantially the same, in most respects, as in England; but there are the following differences. It is generally laid down that the right to the soil of the highway is vested in the crown, and not in the adjoining owners, as in England. This theory, however, has been shaken by recent cases, and has been shown to lead to some absurdities. Streets of burghs are said to be held by the magistrates, under the crown, for the public benefit. The general acts on the subject—viz., 1 and 2 Will. IV. c. 43, and 3 and 4 Will. IV. c. 33, were passed for the regulation of highways, which impose various rules, in detail similar to the English highway and turnpike acts. Parish roads are maintained still on the old system of statute labor. Most of the roads are regulated by special acts of parliament, which are to be taken in conjunction with the general acts. When a public-road is obstructed in Scotland, the party is not indictable; but any one of the public may raise an action of declarator, and so establish the right of the public.

HIGHWAY (*ante*), in a general way the regulation for the construction and management of roads for travel is nearly the same in the United States as in England. Formerly the right to make streets with or without the approval of neighboring property-owners was vested mainly in municipal corporations; but in the case of railways, in modern times, it has become common to require the consent of a majority of the owners along the proposed route. Occasionally, where a road goes through purchased or seized property, it amounts to private property, and none but the owners may intrude thereon. Turnpikes or toll roads were once very numerous, but at present are less so. Cities and towns are responsible for the condition of their highways, and are expected to keep them in good condition. There is a strange difference in the "right of the road" here and in England. In the latter country the law and custom require meeting teams or persons to turn to the left, in the United States it is to the right. Usually the facing owners or cross owners of lots on a highway have the right of property to the middle or across such highway, and may use their property in any way that does not interfere with travel on the road.

HIGHWAYMAN is not a technical legal term, the offense of robbing or assaulting on the highway being included under LARCENY, ROBBERY, or ASSAULT respectively.

HIGLER. See HAWKERS.

HILARIA, a great Roman festival celebrated in honor of Cybele at the vernal equinox. It was begun on Mar. 22, and brought to a close on the 25th. The last day of the feast was the most important, and upon it the inhabitants of the city abandoned themselves to the most extravagant merry-making. All kinds of amusements were then in vogue, especially masquerading, which from the earliest times has been popular in Italy. The only religious ceremony in connection with it was the solemn procession of the priests, who bore round the streets the statue of the great mother of the gods with many solemnities. The festival had for its object the celebration of the departure of winter with its snows and gloom, and hailed the approach of spring.

HILARION, SAINT, 288–371; b. at Gaza of heathen parents. Attracted by the fame of St. Anthony, he went to visit that saint in his solitude, and forthwith became his disciple. Returning to Palestine with some companions while still only a lad of 15, he gave away all the property which he had inherited by the recent death of his parents, and withdrew into the loneliness of the desert between the sea and the marshes on the Egyptian border. In this solitude he observed the most rigid asceticism, and (to quote the quaint remark of Butler) "thought himself at liberty to practice certain mortifications which the respect we owe to our neighbor makes unseasonable in the world." Twenty years of patient continuance in the way of life he had chosen for himself were rewarded, we are told, with miraculous gifts and with rapidly growing fame; disciples and imitators multiplied to the number of two or three thousand, and were all under the spiritual control of Hilarion. When 65 years old, the death of St. Anthony being revealed to him, he undertook an extended tour into Egypt, and visited the scenes of that saint's labors; afterward he proceeded in company of a favorite disciple, Hesychius, to Sicily, where, however, his popularity rendered the quiet and retirement which were congenial to him, impossible. A further migration to Epidaurus thus became necessary, and ultimately he found a resting-place in Cyprus, the diocese of his old friend Epiphanius, where in a lonely cell among some almost inaccessible rocks he died. According to Sozomen, his festival was observed in Palestine with great solemnity as early as the 5th c.; he is now commemorated by the Roman church on Oct. 21.

HILARY, Pope; d. Rome 468 A.D. He succeeded Leo the great in the papal office in 461. He was an earnest promoter of the faith, and was severe in discipline. During his pontificate canons were adopted forbidding the ordination of men who had married a second time; or those who had married widows; and also forbidding bishops to nominate their successors.

HIL'ARY, Saint, Bishop of Poictiers, and doctor of the church, although by no means among the most voluminous of the Latin fathers, yet, from the nature of the subjects on which he wrote, chiefly connected with the Arian controversy, occupies an important place in the patristic literature of the Western church. He was born of pagan parents at Lemonum (Poictiers) in the early part of the 4th century. His conversion to Christianity was mainly the result of his own study of the prophecies, and did not take place till he was advanced in life. About the year 350 he was elected bishop of his native city, and immediately rose to the first place in the animated contest of parties in the Arian controversy. Having provoked the displeasure of the court party, he was imprisoned, and sent into exile in Phrygia; but he appears again in the council of Seleucia in 359, and soon afterwards was permitted to resume possession of his see, where he died, 367. The church holds his day on Jan. 13. His most important work is that on the Trinity, but his three addresses to the emperor Constantius, by their vehemence, and by the boldness of their language, have most attracted the notice of critics. Hilary's theological writings are especially valuable for the history of the Arian party, and particularly for the doctrinal variations of that sect, and the successive phases through which it passed between the council of Nice and the first council of Constantinople. The best edition of the works of St. Hilary is that of the Benedictine Dom. Constant (Paris, 1693), or the reprint of it with additional matter by Maffei (Verona; 1730).—There is a second bishop of the same name who occupies a conspicuous place in the history of the 5th c., Hilary of Arles, born in 401, educated at the celebrated monastic school of Lerins, and made bishop of his native city in 429. As metropolitan of Arles, he presided at several synods, and especially at Orange in 441, the proceedings of which involved him in a serious controversy with the pope, Leo the great. A deposed bishop, named Chelidonius, having carried an appeal to Rome, a council was summoned by pope Leo, at which Hilary was present, and in which the condemnation of Chelidonius, as well as that of another bishop, Projectus, was reversed. Hilary, however, refused to submit to the decision, and soon afterwards quitted Rome—a proceeding which drew upon himself a very severe animadversion. He did not question the authority in itself, but he maintained that it was uncanonically exercised. In the end, however, he sought a reconciliation with pope Leo, and the dispute was brought to an amicable termination. Hilary died in his 48th year at Arles in 449.

HILARY the Deacon, b. in Sardinia in the middle of the 4th c. He and Lucifer of Cagliari appeared at the council of Milan before Constantius, to defend the followers of Athanasius. His remarks offended the emperor so much that he was ordered to be scourged and sentenced to banishment. He held that all heretics, including Arians, should be rebaptized before admission into the Catholic church. Some of the writings ascribed to him are probably not his.

HILARY TERM, one of the English legal terms during which the courts of law sit at Westminster in banc. The term is appointed by statute to commence on Jan. 11 and to end on Jan. 31. The name is said to be borrowed from St. Hilary, bishop of Poictiers.

HILDA, Saint, 614–80; a Saxon lady whose name is intimately associated with the history of the early English church and of early English literature. She was a member of the royal family of Northumbria, her father Hereric being a nephew of king Edwin; and it was along with her royal kinsman that, as a girl of 14, she received baptism at the hands of Paulinus. During the pagan reaction which followed Edwin's defeat and death, Hilda was tempted to settle with her widowed sister Hereswith at the monastery of Chelles, 12 m. from Paris; but she was recalled to England by bishop Aidan, the missionary from Iona, and in 649, two years after her consecration as a nun, she was appointed to succeed Heru the abbess of Heortea or Hartlepool. When, in fulfillment of the vow which he had made before the decisive battle with Penda, Oswy came to dedicate his daughter to God, it was to the care of Hilda that he intrusted her. In 658 the abbess founded the famous monastery on the cliffs of Streoneshalh or Whitby, and for the next 22 years she ruled with rare ability and virtue over the double community of monks and nuns which gathered around her. Among those who shed the most abiding luster on the establishment were St. John of Beverley and the Saxon poet Cædmon. Hilda died, full of years, mourned by her nuns as their common mother. There is a St. Hilda's church both at South Shields and at Hartlepool, and the latter preserves her effigy on its ancient seal. At Whitby the tradition long lingered that on a summer forenoon, when the sun shone in the highest windows of the n. part of the abbey, the figure of lady Hilda could be discerned; and the fossil ammonites of the neighborhood are popularly known as St. Hilda's snakes.

HILDBURGHAU'SEN, chief t. of a circle in the duchy of Saxe-Meiningen, Germany, in a wide and fruitful valley on the river Werra and on the Werra railroad, 17

m. s.e. of Meiningen; pop. '75, 5,162. It is the seat of a district court, of a court of appeal, and of the jury court for the duchy. The streets are wide and regular, and the principal buildings are the former castle of the duchy, erected 1685–95, now used as barracks, with a park in which there is a monument to queen Louise of Prussia; the old town-house, the government buildings, the gymnasium erected in 1877, the normal seminary, and the lunatic asylum. A monument has been erected to those of the citizens who died in the Franco-Prussian war of 1870–71. The manufactures are very various, and include linen fabrics, cloth, papier-maché, toys, buttons, optical instruments, agricultural machines, knives, mineral waters, condensed soups, and condensed milk.

HIL'DEBRAND. See GREGORY VII.

HILDEBRANDT, EDUARD, 1817-68, b. Germany; an artist who commenced life as apprentice to his father, a house-painter at Dantzic. At the age of 20 he went to Berlin, and attracted the attention of Krause, a painter of sea-pieces. His early works betray timidity, and are characterized by great formality; and, had he remained under the influence of German artists, it is questionable whether his genius would ever have triumphed as it did; but, after seeing the French pictures exhibited in Berlin, he was seized with such an enthusiasm for the style he recognized in them, that he set out at once for Paris, and devoted himself to mastering the mysterious secrets of effect, in which the artists of that nation excel. The pictures painted by him upon his return to Germany are impressed with the stamp of the French school, but at the same time reveal the keen active spirit which was quick to render momentary changes of atmosphere and tone. Humboldt's influence led him to travel, and in 1864–65 he accomplished a tour round the world. In his anxiety to produce rapidly, his facility of hand diminished the value of his works for those who regard composition and harmony of tone as the essentials of a picture. His course may be compared to that of a comet, breathlessly rapid and brilliant. He excelled in producing picturesque and startling effects, both by contrast and by his faculty of seizing and reproducing natural phenomena. Fantasies in brilliant colors, views of vast extent, as from the Himalayas and Andes, narrow crowded streets in Suez or Cairo, panoramas, and tortuous lanes and alleys, all served as material for his genius. He died young, and his pictures are scattered throughout Germany; a few of the best being in various collections in Berlin.

HIL'DEN, a t. of Rhenish Prussia, 9 m. e.s.e. from Düsseldorf, on the Itterbach. It is a rapidly-increasing place, with woolen and linen manufactures. Pop. '75, 6,799.

HIL'DESHEIM, an old t. of Hanover, capital of a Prussian administrative division, is situated on the river Innerste, in a pleasant valley surrounded by hills, 24 m. s.e. of Hanover. It is a very quiet town, with very old houses, the upper stories of which are furnished with balconies. It has been a bishop's seat since 822, and its cathedral, dating from the beginning of the 11th c., has bronze gates (date, 1015) 16 ft. high, and covered with bas-reliefs. There are also in the cathedral beautiful paintings on glass, and many art and other treasures. The church of St. Godehard, considered a masterpiece of architecture, dates from 1133 (restored in 1852), and is surmounted with three pyramidal towers. St. Michael's church, nearly an unaltered basilica, dates from 1022 and 1186. In Oct., 1868, some soldiers, digging on the Galgenberg, close by Hildesheim, discovered at a depth of 9 ft. about 60 silver vessels, belonging apparently to the best period of Roman art. Pop. '75, 22,581.

HILDRETH, RICHARD, 1807–65, an author and journalist, b. Mass. He graduated at Harvard college in 1826, studied law in Newburyport, and entered into practice in Boston. In 1832, however, he abandoned the profession to become the editor of the *Boston Atlas.* In the autumn of 1834, being out of health, he went to the south, where he resided nearly two years on a slave plantation. The slavery question was then causing much excitement in the country, and he improved the opportunity to study the workings of the institution for himself. During this time he wrote an antislavery novel, which was published in 1837 under the title of *Archy Moore.* This work was reprinted in England, and in 1852 it was republished in this country under the title of *The White Slave.* It is a tale of thrilling power, and, if the public mind had been prepared for its reception as it was for *Uncle Tom's Cabin,* it could hardly have failed to make an impression as powerful as that produced by Mrs. Stowe's later work. In 1840 appeared his translation of Dumont Bentham's *Theory of Legislation.* His *History of Banks* was published shortly afterwards. When the project for the annexation of Texas began to attract the attention of the country, he published in the *Boston Atlas* a series of articles which did much to intensify the hostility of the northern people to that scheme. He passed the winter of 1837–38 in Washington as correspondent of the *Atlas,* and, upon his return to his editorial chair, entered warmly into the campaign for the election of gen. Harrison to the presidency. In 1840 appeared his *Despotism in America,* a work on the political, economical, and social aspects of slavery. A second edition, with a chapter on *The Legal Basis of Slavery,* appeared in 1854. He published several controversial pamphlets, among them a letter to prof. Andrews Norton, of Cambridge, on *Miracles,* in which the views of that gentleman were warmly opposed. From 1840 to 1843 he resided in Demerara, British Guiana, busying himself in editing two newspapers, in which he advocated the system of free in opposition to slave labor. He also

wrote, while there, his *Theory of Morals* and his *Theory of Politics*, which were published after his return. The work, however, for which he is most likely to be remembered is his *History of the United States*, in six volumes, in which he professes to present the founders of the republic in their true character, without any attempt to heighten their virtues or disguise their mistakes and faults. The history is brought down to the close of Mr. Monroe's first presidential term. In 1855 appeared his *Japan as it Was and Is*. For several years, ending with the inauguration of Lincoln as president, he was engaged on the staff of the *New York Tribune*. He went abroad in the summer of 1861 as U. S. consul at Trieste, and died in Florence.

HILGARD, JULIUS ERASMUS, b. Germany, 1825; came to Illinois in 1835; received a classical education; studied engineering, and in 1845 was employed in the coast survey service, in which he continues. In 1862 he had chief charge of the office, and super vision under the treasury department of weights and measures. He was one of the members of the metric commission at Paris in 1872, and was made one of the permanent committee. In 1847 he was president of the American association for the advancement of science.

HILL, a co. in central Texas, on Brazos river; 1000 sq.m.; pop. '70, 7,453—806 colored. It has an undulating surface, and is largely occupied with forests. The soil is fertile; chief productions: cotton, corn, and pork. Co. seat, Hillsborough.

HILL, AMBROSE POWELL, 1825–65; graduate of the West Point academy; served in the Mexican and Florida wars; afterwards in the coast survey, and in 1861 resigned and took military service in aid of the rebellion. He rose to be lieut.gen., but was killed before Petersburg by a rifle-shot.

HILL, BENJAMIN HARVEY, b. Ga., 1823; graduated at the state university, and began the practice of law in 1845. Six years later he was elected a member of the legislature. He was an early and earnest secessionist, and one of the most outspoken. He was a member of the provisional confederate congress, and a senator in the regular congress. In 1865 he was for a time a prisoner of war. He was always an earnest democrat, and in 1872 was a zealous supporter of Greeley for the presidency.

HILL, ISAAC, 1788–1851; b. Mass.; became a printer, and editor and proprietor of the *New Hampshire Patriot*, a noted democratic newspaper. He was chosen U. S. senator from New Hampshire in 1830; was governor, 1836–39; and was afterwards an officer of the treasury department in Boston. He was for many years the publisher of *The Farmer's Monthly Visitor*.

HILL, JOHN HENRY, D.D., LL.D.; b. N. Y. 1791; graduated at Columbia college, and entered the Protestant Episcopal ministry. He went as a missionary to Greece about 1835, and has been on duty there for half a century.

HILL, Sir ROWLAND, K.C.B., post-office reformer, was b. at Kidderminster, Dec. 3, 1795. His father conducted a school near Birmingham, which was celebrated in connection with the "Hazelwood system of education" (afterwards removed to Bruce castle, Tottenham), and in which Hill was engaged as a teacher until the year 1833. He there joined an association which obtained an act for establishing the colony of South Australia, with the design of reducing to practice Mr. Gibbon Wakefield's scheme of colonization. Hill became secretary to the royal commissioners, who at first managed the affairs of South Australia. He was also a member of the committee of the society for the diffusion of useful knowledge. The high rate of postage had for many years engaged his attention, and in 1837 he published a pamphlet recommending a low and uniform rate of postage throughout the British isles. Petitions were poured into the house of commons in favor of Hill's plan, and in 1837 the house appointed a committee to investigate the merits of penny-postage. In 1840 the principle of a uniform rate of postage was adopted, and an experimental charge of 4d. per letter was levied. This was shortly afterwards followed by the present uniform penny-rate. Hill was placed in the treasury, and was working out his measure when the Tory government succeeded to power, and dismissed him. A subscription was got up at once to reward a public benefactor, and mark the public sense of his dismissal, and the sum of £15,000 was presented to Hill. In 1846, when the whigs returned to office, Hill was appointed secretary to the postmaster-general. In 1854 he succeeded col. Maberley as secretary to the post-office, an appointment which he held till failing health compelled him to resign in 1864. His full salary of £2,000 a year was awarded him for life, and he also received a parliamentary grant of £20,000. He was made K.C.B. in 1860, and D.C.L. (Oxon) in 1864 (see POST-OFFICE). The money-order office is one of the offshoots of penny postage; and parliament, in 1861, engrafted a system of post-office savings-banks upon the postal-service, which was carried out by Hill with his usual administrative ability and success.—His eldest brother, MATTHEW DAVENPORT HILL (died 1872), long the recorder of Birmingham, distinguished himself by his labors for the education of the people, and the reformation of criminals. One of his brothers, Mr. EDWIN HILL, was the inspector of stamps at Somerset house; and another, Mr. FREDERIC HILL, was the first to propound and enforce those humane principles upon which modern prison discipline is founded; and his work, *On Crime*, is a standard authority for legislators. He was assistant secretary to the post-office.

HILL, VISCOUNT (ROWLAND HILL), British gen. and commander-in-chief, a scion of the ancient and distinguished family of the Hills of Shropshire, was second son of sir John Hill, bart., of Hawkstone. He was b. Aug. 11, 1772, entered the army at the age of 15, and obtained a captaincy before he was 20. He took part in the disastrous campaign in which sir John Moore lost his life. He also served in the campaigns of 1809, 1810, and 1811, under the duke of Wellington, and displayed conspicuous gallantry, as well as great talents as a commander. In the peninsular engagements he was usually intrusted with the most important duties next to those which devolved upon the duke of Wellington; and when the army returned home the fame of Hill was second only to that of the great commander. He was created baron Hill of Almarez and Hawkstone, received a parliamentary grant of £2,000 a year; and both title and annuity were granted to his nephew in remainder. He was also made G.C.B. He commanded a division at Waterloo, and remained with the army of occupation, as second in command, until it evacuated the French territory. He succeeded the duke of Wellington in 1828 as commander-in-chief of the army, and dispensed the patronage which he possessed with great impartiality. In 1842 his health declined, and the duke of Wellington once more took the command of the army. After his resignation, Hill was created a viscount. He died unmarried at Hardwicke Grange, co. of Salop, Dec. 10, 1842, in his 71st year. He was succeeded in his titles and estates by his nephew, sir R. Hill, bart.

HILL, ROWLAND, 1744–1833; an English preacher of great eccentricity. While still at Cambridge he made the acquaintance of the Methodist preacher Whitefield, and stimulated by his example he scandalized the university authorities and his own friends by preaching in the surrounding villages before taking holy orders, and conducting religious services in the houses of the sick and poor. He graduated with honor, and taking orders, was appointed, 1773, to the parish of Kingston, Somersetshire, where he indulged his taste for open-air preaching, and attracted great crowds to the services which he held nearly every day of the week. Having on the death of his father in 1780 inherited considerable property, he built for his own use Surrey chapel, in the Blackfriars road, London. The chapel was opened June 8, 1783. Although he now occupied a position as a dissenting minister, Hill conducted his services in accordance with the forms of the church of England, in whose communion he always remained. From the first his success was perfect, and his chapel soon became filled with a larger congregation than any other in London. In the summer months he made what he called "gospel-tours" into all parts of the country, sometimes extending them to Scotland and Ireland, and attracting wherever he went crowded and interested audiences. After these tours he invariably returned with increased enthusiasm to his duties at the Surrey chapel, where he continued to officiate to the end of his life. His oratorical powers, like those of Whitefield, were specially adapted for rude and uncultivated audiences, and were equally effective. He possessed a voice of great power, and, according to Southey, "his manner" was "that of a performer as great in his own line as Kean or Kemble." He occasionally violated laws of good taste by the eccentricities of his wit and humor, but the intensity and purity of the purpose by which he was actuated maintained his moral influence. Among other publications he wrote *Village Dialogues,* which first appeared in 1810, and reached a 34th edition in 1839.

HILL, THOMAS, D.D., LL.D., b. N. J., 1818; educated at Harvard; studied theology; settled at Waltham, Mass., in 1845; in 1859 became president of Antioch college, and in 1862 of Harvard college; resigned in 1868. He accompanied Agassiz on his expedition to South America, and upon his return took a pastoral charge in Portland, Me. He has published poems, an elementary treatise on arithmetic, a work on geometry; *Liberal Education; Jesus the Interpreter of Nature; Natural Sources of Theology,* etc.

HIL'LAH, or HILLA, a t. of Turkey in Asia, in the pashalic of Bagdad, and 60 m. s. of the city of that name, is situated on both banks of the Euphrates, and is built on the ruins of ancient Babylon (q.v.). Here the Euphrates is 450 ft. in width, and is crossed by a floating bridge. Hillah is a fortified town, contains a citadel, a mosque, and several well-stocked bazaars. Dyeing, tanning, and manufactures of silk are here carried on. The population, which is fluctuating, may be stated at between 7,000 and 10,000.

HILLARD, GEORGE STILLMAN, LL.D., b. Me., 1808; graduated at Harvard, 1828; was assistant of George Bancroft in a seminary at Northampton, Mass.; in 1833 became a member of the bar in Boston, and soon acquired a large practice. He was chief officer of the Boston common council; a member of the state legislature and of the senate, and in 1867 U. S. district attorney. In connection with George Ripley, he was, in 1833, editor of the *Christian Register,* a Unitarian paper. Subsequently he turned his attention to literary work and to lecturing. In 1853 he traveled in Europe, and on his return published *Six Months in Italy,* which has passed through many editions, and is still a standard work of its class. He was afterwards a regular contributor to the Boston *Courier,* and wrote a number of biographical works.

HIL'LEL, HABABLI (the Babylonian), or HAZAKEN (the elder), one of the most eminent and influential doctors of the Jewish law, was b. about 112 B.C. in Babylonia, of

poor parents, but in the female line of royal (Davidian) descent. Forty years old—so the legend runs—he migrated into Palestine for the sake of studying the law; and of the small sum he earned by hard manual labor, he gave half to the door-keeper of the academy, where Shemaja and Abtalion, the great masters of the period, expounded the Halacha (q.v.); and before long he became one of the favorite and foremost pupils of Abtalion. Five or six years (Sabb. 15 a.) after Herod had mounted the throne, Hillel was elected Nasi, or president of the Sanhedrim. The range of his acquirements is said to have been immense; embracing not only Scripture and tradition, but nearly all branches of human and "*superhuman*" knowledge. Yet he was one of the meekest, most modest, kind, and simple-hearted men. "Be of the pupils of Aaron, a friend of peace, a promoter of peace, loving mankind, and bringing them nearer to the divine law" (Aboth, i. 2). "Do not confide in thyself, until the day of thy death" (Aboth, ii. 3). "Do not judge thy neighbor, until thou hast been in his place thyself" (Aboth, ii. 5). Such were some of his most favorite sayings. Still more characteristic, and highly curious, if compared with Matt. vii. 12, is the answer he gave to a heathen who, in a spirit of mockery, requested him to teach him "all the law of Moses" while he could stand on one leg. "Do not unto others as thou wouldst not have others do unto thee," Hillel replied; "that is all the law; the rest is mere comment" (Babyl. Talm. Shabb. 31 a.). Hillel was also the first who collected the numberless traditions of the oral law, and arranged them under six heads (see MISHNA). The often alluded to and highly exaggerated dispute between Hillel and his school and Shammai (q.v.), the contemporaneous supreme judge of the Sanhedrim (*Ab-Beth-Din*), and his school, resolves itself into a mere theoretical one: the decisions themselves are, with a very few and unimportant exceptions, identical. Hillel, however, was the more popular of the two, and the majority was, on account of the better authorities he was able to quote in his support, generally on his side.

The time of Hillel's death is uncertain. He is said to have lived, like Moses, 120 years: 40 years in ignorance of the law, 40 years as the humblest pupil of the law, and 40 years as the highest master of the law. A verse of the dirge composed at his death has survived: "Woe for the pious, the modest, the disciple of Ezra" (Sanh. 11 a.). For the further influence of his house and school, see GAMALIEL and TALMUD.

HILLHOUSE, JAMES, LL.D., 1754–1832; b. Conn.; graduated at Yale, and practiced law. He took an active part in the war of the revolution, and at the invasion of New Haven by the English, commanded the governor's guards. In 1791 he became a member of congress, a senator in 1795, and temporary president of the senate in 1800. In 1815 he was a member of the Hartford convention.

HILLHOUSE, JAMES ABRAHAM, 1789–1841; b. Conn.; in early life was a merchant, and in 1819 visited Europe. About 1832 he retired from active business and devoted himself to literature, more especially to verse. His chief works are *Percy's Masque; Hadad;* and *The Judgment.* His poems have been collected and published.

HILL MUSTARD. See BUNIAS.

HILLSBOROUGH, a co. in w. Florida, on the gulf of Mexico and Tampa bay; 2,900 sq.m.; pop. '70, 3,216—546 colored. Surface low and level; productions: cotton, sugar, corn, etc. Co. seat, Tampa.

HILLSBOROUGH, a co. in s. New Hampshire, on the Massachusetts border, on the Merrimac, the Contoocook and other rivers, and intersected by three railroads; 900 sq.m.; pop. '70, 64,238; in '80, 75,606. It has a hilly surface, and much of it is covered with forests. Chief productions: corn, butter, potatoes, and hay. Co. seats three in number: Manchester, Nashua, and Amherst.

HILLSDALE, a co. in s. Michigan, on the Ohio border; drained by the Kalamazoo river, intersected by the Michigan Southern, and the Detroit, Hillsdale, and Southwestern railroad; 580 sq.m.; pop. '80, 32,726. It has a diversified surface, with expansive forests. The soil is fertile, producing wheat, corn, etc. Co. seat, Hillsdale.

HILLSDALE, a city and seat of justice of Hillsdale co., Mich., on the Lake Shore and Michigan Southern railroad, near the St. Joseph's river, 90 m. w.s.w. of Detroit; pop. 3,684. Hillsdale college (Free Baptist) is situated here, and there are churches, banks, good schools, and a number of manufactories.

HILL STATES, a number of small principalities of India, on the left or e. side of the upper Sutlej, comprise about 10,000 sq.m., and about 550,000 inhabitants. With the exception of this aggregate name, they have but little in common with each other. Perhaps 20 may be reckoned which have a distinct existence—those best known being Bhagul, Bussahir, and Gurwhal.

HILO, in regard to size the second t. in the Sandwich islands; pop. '72, 4,220. It is on the e. coast of Hawaii, and has a good harbor, protected by a reef of lava and coral. The town and region are famous for natural beauty. There are four churches, including a Protestant and Roman Catholic church for the natives, a foreign church, and a bethel for sailors. The trade-winds striking against Mauna Kea, a mountain back of the district of Hilo, bring very frequent rains, the rainfall measuring 182 in. in a single year. These rains supply some 50 streams, which empty into the sea within a coast line of 25 m., and are often swollen with violent freshets.

HILTED, a term used in heraldry, to indicate the tincture of the handle of a sword.

HIL'VERSUM, a beautifully situated village in n. Holland, lies 15 m. s.e. from Amsterdam, in the midst of undulating corn-fields, variegated with woodlands. The chief industries are agriculture, the manufacture of strong striped white cottons, carpets, and horse-cloths, spinning and dyeing wool. There are two public schools, with 600 pupils, an institute for young ladies, and another for young gentlemen, a Reformed church, a Roman Catholic church, and a Jewish synagogue. Pop about 6,300.

HIMERA, a city on the n. coast of Sicily, founded 648 B.C. by Carthaginians and exiles from Syracuse, who imparted a Doric character to the language. Early in the 5th c., the tyrant Terillus, being expelled by Theron of Agrigentum, invoked the aid of the Carthaginians. They gladly availed themselves of the pretext, but their general, Hamilcar, was defeated at Himera by the Greeks under Gelon of Syracuse, 480 B.C. Thrasydæus, son of Theron, brought a large body of Doric emigrants to the city in 476; but was soon expelled by Hiero. Himera seems to have enjoyed great prosperity during the remainder of the 5th century. In 415 it refused admittance to the Athenian fleet, and remained a zealous ally of Syracuse. In 408 the Carthaginians sent another great army under Hannibal, grandson of Hamilcar, who razed the city to the ground. A new city, Thermæ Himerenses, was founded in 407 close to the former site. The name was derived from the famous hot springs in which Hercules was said to have bathed. The new city remained in Carthaginian hands until it was annexed by the Romans during the second Punic war. It was peculiarly favored by them, and was left a free city under its own laws. In the time of Cicero it was a flourishing town, though not very large. Under Augustus it became a colony. From that time little is known of it, although the site was never deserted, and the town still exists under the name of Termini. Ergotetes, an Olympian victor celebrated by Pindar, was a citizen of Himera. Stesichorus the poet was a native of the city; and his statue was preserved at Thermæ in the time of Cicero. Agathocles also was a native of Thermæ.

HIMA'LAYA ("the abode of snow," from the Sanscrit, *hima*, snow, and *ālaya*, abode), in s. central Asia, is the most elevated and stupendous mountain system on the globe. It is not, as sometimes represented, a single chain, but a range of rugged snowy peaks depending from the high table-land of Thibet, and separated by deep gorges, the outlets of the streams originating in the melted snow and ice of the interior. The mass of the Himalaya proper extends from the great bend of the Indus in the w., to the junction of the Sampu with the Brahmaputra in the e., or from long. 73° 23′ to 95° 40′ e., a distance of nearly 1500 miles. Their average breadth is about 150 miles. The mean elevation of the range is from 16,000 to 18,000 ft., but 45 of its peaks are now known to exceed 23,000 ft. in height. Of these there are in Kumaon, Nanda Devi, 25,749 ft.; in Nepaul, Dhawalagiri, 26,826 ft.; Mount Everest, 29,002 (the highest known point on the globe); and Kunchinjinga, 28,156 ft.; in Bhotan, Chumalari is 23,946 ft. above the sea. The southern surface of the Himalaya comprises three distinct regions—first, adjoining the plains of Hindustan, the *Tarai*, a grass-covered marshy plain; next, the great belt of *Saul Wood*, stretching along a great part of the range; and beyond it the *Dhuns*, a belt of detritus, extending to the foot of the true mountains.

Above these regions, which are extremely unhealthy, are placed the sanitaria for troops—Darjeeling, Simla, Muree. There are no plains and but few lakes in the Himalaya; the chief of the latter are Nainital, in Kumaon, 6,520 ft., and the lake of Cashmir, 5,126 ft. above the sea.

Snow falls at rare intervals in the mountains as low as 2,500 ft., but at 6,000 ft. it snows regularly every winter. The limit of perennial snow in the Himalaya is 16,200 ft. on the s., and 17,400 ft. on the n. side; an anomaly probably owing to the dry atmosphere of Thibet, and the small quantity of rain and snow that falls there. The high range of the Himalaya forms a vast screen which intercepts and condenses nearly all the moisture carried by the winds from the Indian ocean, and deposits it on the southern face of the mountains; hence at Chirra Punji, 4,200 ft. above the sea, as much as 600 in. of rain has been known to fall in one year. Glaciers are found in every part of the range above the snow-line; one of these, that of Deotal in Gurhwal, is 17,945 ft. above the sea. The mean height of the passes in the Himalaya is 17,800 ft., the highest known is Ibi-Gamin pass into Gurhwal, 20,457 ft., and the highest used for traffic is the Parang pass in Spiti, 18,500 ft. above the sea. All the passes above 16,000 ft. are closed with snow from Nov. till May. Trees and cultivated grains attain their highest limits in the mountains at 11,800 and shrubs at 15,200 ft. above the sea. The tea-plant can be cultivated along the entire southern face of the Himalaya to an elevation of 5,000 ft., but the best is produced at from 2,000 to 3,000 ft. above the sea. Tigers and apes are found at an elevation of 11,000, and the leopard at 13,000 ft., while the dog follows the herds over passes 18,000 ft. high. Snakes are found at an elevation of 15,000 ft., but the highest limit of the mosquito is 8,000 ft. above the sea. The geological structure of the Himalayas consists of crystalline rocks, with granite, gneiss, and a schistose formation, comprising micaceous, chloritic, and talcose schists. Earthquakes are of frequent occurrence in the central range. About the meridian of 82° e., near the Mansarowar lake, a great transverse range, which further n. is called the Giang-ri mountains, abuts against the Himalaya from Thibet. This ridge forms the water-

shed between the Sanpu (afterwards the Brahmaputra) on the e., and the Indus and Ganges on the west. These vast river systems, with their magnificent tributaries, derive their chief supplies from the melting of the snows in the Himalaya, and consequently are in flood at the hottest season of the year when the moisture they supply is most needed.

On account of the majestic height of this mountain range, and the apparent impossibility of reaching its summit, the imagination of the ancient Hindus invested it with the most mysterious properties, and connected it with the history of some of their deities. In the Purânas, the Himalaya is placed to the s. of the fabulous mountain Meru, which stands in the center of the world (see MERU), and described as the king of the mountains, who was inaugurated as such when Prithu was installed in the government of the earth. As the abode of Siva, he is the goal of penitent pilgrims, who repair to his summit in order to win the favors of this terrific god. His wife was Menâ, whom the Pitris or demigods Vairâjas engendered by the mere power of their thought.

HIMILCO, or HIMILCAR, a Cathaginian navigator, who explored the n.w. coast of Europe, about 570 B.C., at the same time that Hanno explored the w. coast of Africa. Avienus has preserved some fragments of the history of this voyage, in which mention is made of the Hiberni and Albioni, and of a promontory, Oestrymnis, thought to be Cornwall, and a group, Oestrymnides, thought to be the Scilly islands.

HIMILCO, or HIMILCAR, a Carthaginian general, son of Hanno, who commanded the expedition against Sicily, 406 B.C., and conquered the w. part of that island. When Dionysius renewed the war, 397 B.C., Himilco again commanded the Carthaginians, at first with success, but subsequently Dionysius assaulted him when greatly disabled by pestilence, and forced upon him a disgraceful capitulation. Himilco abandoned his allies and mercenaries to the mercy of the enemy, and actually paid a large gratuity for permission to depart himself with his native Carthaginians. The disgrace of this surrender so weighed upon him, that soon after returning to Carthage he committed suicide.

HIMMALEH. See HIMALAYA.

HIMYARITES, people of Arabia who claim Himyar, one of the mythical fathers of the Arabians 3,000 years before the time of Mohammed, to have been their ancestor. In s. Arabia they built prosperous towns, Aden among them, and spread their rule over the opposite African coast. At one time they favored Christianity, but in 529 A.D. they were conquered by the Ethiopians and compelled to renounce their faith. About 630 A.D. they were subjected by the Mohammedans and compelled to profess that faith.

HIMYARITIC LANGUAGE AND INSCRIPTIONS, or the language of the races from the Euphrates to Abyssinia, who trace their orgin to Himyar. It is doubtful whether it is a dialect of Arabic only or an independent language. Inscriptions in this language are to be found in s. Arabia, and some specimens are now in the British museum. They probably date from the later Himyarite kings, who flourished from 100 B.C. to A.D. 500. Osiander considers the Himyaritic language as an early form of Hebrew and Assyrian.

HINCK'LEY, a manufacturing and market t. of England, in the co. of Leicester, 13 m. s.w. of the town of that name, and 99 m. n.n.w. of London. Its parish church, with a beautiful old oak roof, is supposed to have been erected during the reign of Edward III. Hinckley has manufactures of cotton hosiery. Part of the town is in Warwickshire. Pop. '71, 6,902.

HINCKS, EDWARD, D.D.; 1792–1866; b. Ireland; graduated at Trinity college, Dublin, and became a clergyman. In 1826 he was appointed rector of the parish of Killyleagh. He was an enthusiastic archæologist, and wrote on Egyptian and Assyrian inscriptions. He published a catalogue of the Egyptian manuscripts preserved in the library of Trinity college, and some works on religious subjects.

HINCKS, Sir FRANCIS, b. Ireland, 1807; was engaged in early life in mercantile business in Canada, and subsequently in journalism, being proprietor of the *Toronto Examiner*. He was successively finance minister of the colony, and in 1851 prime-minister. In 1855 he was made governor of the Windward islands, and governor of British Guiana in 1862. In 1869 he was knighted, and was again chosen finance minister of Canada.

HINC'MAR, a celebrated churchman of the 9th c., was b. in 806. The exact place of his birth is unknown, but from his being of the family of the counts of Toulouse, it is presumed to have been in that province. He was educated in the monastery of St. Denis, and, with the sanction of the council of Paris (829), he was intrusted with the framing and carrying out a plan for the reformation of the monastery. Some time afterwards, he was named abbot of the abbeys of Compiègne and St. Germain; and in 845 was elected archbishop of Rheims. The most important event, considered historically, in the career of Hincmar, is his controversy with pope Nicholas I. in the year 862 (see NICHOLAS I.). Rothadius, bishop of Soissons and suffragan of Hincmar, deposed a priest of his diocese, who appealed to Hincmar as metropolitan, and was ordered by him to be restored to office. Rothadius resisting this order, and having

been, in consequence, condemned and excommunicated by the archbishop, appealed to the pope, who at once ordered Hincmar to restore Rothadius, or to appear at Rome in person or by his representative, to vindicate the sentence. Hincmar sent a legate to Rome, but refused to restore the deposed bishop; whereupon Nicholas annulled the sentence, and required that the cause should again be heard in Rome. Hincmar, after some demur, was forced to acquiesce. The cause of Rothadius was re-examined, and he was acquitted, and restored to his see.

The conduct of Hincmar is also historically interesting in relation to the temporal power of the mediæval papacy (see POPES). Under the successor of Nicholas, Adrian II., a question arose as to the succession to the sovereignty of Lorraine on the death of king Lothaire, the pope favoring the pretensions of the emperor Lewis in opposition to those of Charles the bold of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the censures of the church, Hincmar offered a firm and persistent opposition. He was equally firm in resisting the undue extension of the royal prerogative in ecclesiastical affairs. When the emperor Lewis III., in opposition to the solemn judgment of the council of Vienne, sought to obtrude an unworthy favorite, Odacer, upon the see of Beauvais, Hincmar boldly remonstrated, and fearlessly denounced the unjustifiable usurpation. Hincmar died in the year 882. His works were collected in two vols. folio by Père Sirmond, S. J. (Paris, 1645). Several other pieces of his are found in the 8th vol. of Labbe's *Collection of Councils*, and in the 5th vol. of that of Hardouin; as also in Père Cellot's *Concil. Duziac.* (Paris, 1658). Many others of his works, still in MS., are enumerated in Wetzer's *Kirchen-Lexicon*, v. 308.

HIND, the female of the stag (q.v.) or red deer. The term is also sometimes used to designate the female of some other species of deer—never being so applied, however, to any other British or European species; and is sometimes even extended to female antelopes. In the strictest use of the term hind, according to the ancient laws and customs of "venerie," it did not become the designation of a female red deer until the third year of its age.

HIND, JOHN RUSSELL, an English astronomer, was b. at Nottingham, May 12, 1823. At an early period he became an enthusiast in the study of astronomy, and in 1840 obtained, through the influence of prof. Wheatstone, a situation in the royal observatory at Greenwich, where he remained till June, 1844. Hind was then sent as one of the commission appointed to determine the exact longitude of Valentia, and on his return was appointed to a post in Mr. Bishop's observatory, Regent's park, London. Here he made those observations, the results of which have rendered his name renowned in the scientific world. He has calculated the orbits and declination of more than 70 planets and comets, noted 16 new movable stars, and 3 nebulæ, and discovered 10 new planets, viz., Iris and Flora in 1847, Victoria in 1850, Irene in 1851, Melpomene, Fortuna, Calliope, and Thalia in 1852, Euterpe in 1853, and Urania in 1854. In 1851 Hind obtained from the academy of sciences, Paris, the Lalande medal, and was elected a corresponding member. In 1852 he obtained the astronomical society of London's gold medal, and a pension of £200 a year from the British government. He also superintends the publication of the *Nautical Almanac*. Hind's scientific papers have generally been published in the *Transactions of the Astronomical Society*, in the *Comptes Rendus* of Paris, and the *Astronomische Nachrichten* of Altona. Hind's popular works are—*Recent Comets and the Elements of their Orbits* (published in the *Athenæum*, Aug. 9, 1845); *Astronomical Vocabulary* (16mo, 1852); *The Comets* (12mo, 1852); *The Solar System* (8vo, 1852); *Illustrated London Astronomy* (8vo, 1853). *Elements of Algebra* (Lond. 1855); *Descriptive Treatise on Comets* (1857), etc.

HINDLEY, a t. of Lancashire, England, 3 m. s.e. from Wigan, with which it is connected by railway, on the Manchester road. Its growth has of late years been rapid. There are numerous coal-works in the vicinity; cotton-spinning and the manufacture of cotton goods are also extensively prosecuted. There are places of worship belonging to the church of England, and to a number of other denominations; a free grammar-school, and numerous other schools. Pop. '61, 8,477; '71, 10,627.

HINDS, a co. in s.w. central Mississippi, on Pearl and Big Black rivers, crossed by the Vicksburg and Meriden, and the New Orleans, St. Louis and Chicago railroads; 930 sq.m.; pop. '70, 30,488. The surface is level and the soil fertile; cotton, corn, and pork are the chief products. Co. seat, Jackson (the state capital).

HINDU KUSH, or INDIAN CAUCASUS, forms the westward continuation of the Himalaya, being sometimes reckoned a part of that colossal range. It extends from the Upper Indus on the e. to the Bamian pass (q.v.) on the w., stretching in n. lat. between 34° and 36°, and in e. long. between 68° and 75°. Separating Afghanistan on the s. from Turkistan on the n., it sends off the Oxus through the latter, and the Helmund through the former, to two salt lakes—the Oxus to Aral, and the Helmund to Hamûn. The loftiest summit is Hindu Koh, situated about 80 m. to the n. of the city of Cabul, and estimated to be more than 20,000 ft. above the sea. Unlike the Himalaya Proper, the chain is a water-shed, and is also remarkably destitute of timber; while, like the ridge in question, it presents an appearance of much greater height towards the s. than towards the north.

HINDU LAW, RELIGION, etc. See INDIA.

HINDUSTAN', meaning *The Land of the Hindus,* is a term of the same class as Turkistan, Afghanistan, Farsistan, Beloochistan, or Frangistan (the oriental name of western Europe). See INDIA.

HINGE, the pivots or joints on which doors, shutters, etc., revolve. The simplest form of hinge is a projection cut upon the substance of which the door is made, and fitted into a hole. This is sometimes done with wooden shutters, and there are examples extant of *stone shutters* hinged in this manner. The cathedral of *Torcello,* near Venice, which dates from the 11th c., still has the windows protected with shutters formed of large slabs of stone, hinged on stone pivots. During the middle ages, hinges, as well as every other useful article, were made subjects of ornamentation. The earliest ornamental hinges date from about the 10th century. The first examples are cramped and stiff, and the scrolls are frequently terminated with animals' heads. In the early English and decorated styles, the hinges and other metal-work were very elaborate and beautiful in design, and frequently extended over the whole of the doors. In the perpendicular style, hinges were usually very simple in form, the paneling of the wood-work not admitting of much ornamental iron-work. In modern times hinges have almost entirely lost their ornamental character. They are chiefly made of brass and iron, and fitted on the edges of the doors and shutters, where they are concealed. "Double-jointed edge-hinges" are those now most in use. The revival of mediæval architecture has, however, given an impulse to the manufacture of ornamental metal-work, and hinges of varied and good design are now generally used in connection with Gothic architecture.

HINGHAM, a t. in Plymouth co., Mass., on the sea-coast, intersected by the Old Colony railroad; the village is 12 m. by water from Boston; pop. of township, 4,485. The village is a strange old place near Nantasket. It was settled in 1635, and its first pastor came from the place of the same name in England. In the cemetery there is a fine monument to the early settlers, and a statue to the memory of John A. Andrew, the "war governor" of Massachusetts. Derby academy is located here, and there are other schools, churches, and manufactures. It is a popular place of summer resort.

HINNOM, VALLEY OF. See GEHENNA.

HINNY, the hybrid produced between a horse and a female ass. It is smaller than a mule, but the body is more bulky in proportion to the legs, and its strength is inferior. It is less valuable than the mule, although it is more docile. The hinny is rare. It was described by some of the earlier naturalists as a hybrid between the ox and the ass, and even Buffon seems to have entertained this notion.

HINOJOSA-DEL-DUQUE, a t. of Spain, in the province of Cordova, and 45 m. n.w. of the city of that name, consists of spacious streets, with neat white-washed houses, each with a garden or court attached. It has several convents and hospitals, and linen and woolen manufactures. Pop. between 7,000 and 8,000.

HINSDALE, a co. in s.w. Colorado on the Rio del Norte and Gunnison rivers, formed after the census of 1870. The surface is mountainous, and some of the peaks are remarkably high. There are silver mines in operation. Co. seat, Lake City.

HINSDALE, BURKE AARON, b. Ohio, 1837; educated at Hiram college, and in 1861 entered the Campbellite ministry, officiating in Cleveland and other places. In 1866 he was chosen assistant editor of the *Christian Standard.* In 1869 he was professor of history in Hiram college, and the next year became its president. He is the author of *Genuineness and Authenticity of the Gospel; The Evolution of the Theological and Doctrinal Systems of the Ancient Church;* and *Republican Text-Book for* 1880.

HINTON, JOHN HOWARD, 1791–1873; b. England; a Baptist preacher, and a zealous advocate of voluntary work in education and religion. He wrote *History and Topography of the United States; Elements of Natural History;* etc.

HIOGO, or FIOGO, a seaport of Japan on the island of Hondo, at the head of the gulf of Osaka. There is an excellent harbor, a town-hall, custom-house, government machine-shops, gas-light for the streets, and extensive trade.

HIOUEN-THSANG, a celebrated Chinese traveler, professing the Buddhist creed, who visited 110 countries and places of India in the first half of the 7th c. (629–645), and gave a very detailed and interesting account of the condition of Buddhism as it prevailed at that period in India. His inquiries having been chiefly devoted to the objects of his veneration, he did not enter so much into details concerning the social and political condition of India as might be desired; but considering the many curious notices he gives on other matters which, besides those of Buddhist interest, came under his observation, and the high degree of trustworthiness which his narrative possesses, his memoirs must be looked upon as one of the most important works on the history of India in general, and of Buddhism in particular, during the period stated. Apparently, he traveled alone, or with a few occasional companions; and wearing the garb of a religious mendicant, with nothing but a staff, wallet, and water-pot, he does not seem to have been exposed to any dangerous adventures on his journey from China to India. It is more remarkable, however, that he incurred no impediment on his way

home, when he traveled with 500 packages of books, besides images of Buddha and various sacred relics; and his immunity from danger affords a remarkable proof of the civilized condition of the countries which he described. It does not appear that the account of his travels was written by himself, for of the two works relating to them neither is the performance of Hiouen-Thsang. The first is a bibliographical notice of him, in which his travels form a principal feature; it was composed by two of his pupils, Hoeï-li and Yen-Thsong. The latter bears the title of *Ta-thang-si-yu-ki*, or "Memoirs of the Countries of the West, published under the Thang," and was edited by Pien-ki, since Hiouen-Thsang himself, who during 17 years had spoken none but foreign languages, had perhaps lost the facility of writing elegant Chinese. According to a remark added to the title of his work in the imperial Chinese edition, it would follow that it had been translated from Sanscrit into Chinese; but this statement, as prof. Stanislas Julien observes, can only mean that the fundamental part of the work relating to history, legends, etc., was taken from Hindu sources, since it is obvious that the indication of distances and numerous personal observations must have come from Hiouen-Thsang himself. Both works have been published in a French translation by the distinguished Chinese scholar, M. Stanislas Julien, who has acquitted himself of the great and peculiar difficulties of his task in so creditable a manner that his *Histoire de la Vie de Hiouen-Thsang* (Paris, 1853) and his *Mémoires sur les Contrées Occidentales, par Hiouen-Thsang* (2 vols., Paris, 1857–1858) have not only become indispensable to the student of Chinese and Sanscrit literature, but will be a lasting honor to M. Julien's industry and scholarship. An abstract of both works, by the late prof. H. H. Wilson, appeared in the 17th volume of the journal of the royal Asiatic society, pp. 106–137.

HIP, or Hep, the fruit of the rose. It is almost always red, and consists of the enlarged fleshy tube of the calyx filled with hard seed-like *achænia*, which are surrounded with bristly hairs (*setæ*). The fleshy covering contains mucilage, sugar, gum, malic and citric acids, tannin, resin, and a number of salts. The setæ excite itching in the skin. The fleshy part of hips, beaten to a pulp, and preserved with sugar, finds a place in the pharmacopœia, under the name of conserve of hips (*conserva rosæ fructûs, confectio rosæ caninæ*, etc.). It is slightly refrigerant and astringent, and is often used as a vehicle or basis for other medicines. Hips eaten entire are a popular remedy for ascarides, on which their action is purely mechanical, and is owing to the irritating setæ. The hips of different species of rose are almost indiscriminately used. In some parts of Europe hips are preserved in sugar as an article of food, or are dried and used in soups and stews, the achænia and setæ being removed. For this purpose, the large soft hips of the apple rose (*rosa pomifera*) are preferred.

HIP, in architecture, the rafter at the angle where two sloping roofs meet. A roof is called a hipped roof when the end is sloped upwards so as to form a hip on each side.

HIP-JOINT is a ball-and-socket joint formed by the reception of the globular head of the thigh-bone (or femur) into the deep pit or cup in the *os innominatum*, which is known as the *acetabulum* (so called from its resemblance to the vinegar cups used by the Romans. If the variety of the movements of this joint—viz., flexion, extension, abduction, adduction, and rotation inwards and outwards, and at the same time its great strength are considered, it may well claim to be regarded as the most perfect joint in the whole body.

The ligaments are usually described as five in number—viz.: 1. The capsular; 2. The ilio-femoral; 3. The *teres* or round; 4. The cotyloid; and 5. The transverse. Of these, the capsular ligament is the most important, and extends from the edge of the cup to the circumference of the neck upon which the ball is carried, inclosing the bony parts in a strong sheath. The ilio-femoral is merely an accessory band of fibers which give increased thickness to the capsular ligament in front, where strength is specially required. The great use of the capsular ligament is to limit the extension of the hip-joint, and thus to give steadiness to the erect posture. The only other ligament requiring notice is the *L. teres*, or round ligament, which is in reality triangular rather than round, and has its apex attached to the head of the thigh-bone, while its base is connected with the cavity of the acetabulum. Its use is not very clearly known, but probably is to limit movement in one direction. It is sometimes absent in cases in which no special weakness of the joint was observed during life, and is of by no means constant occurrence in mammals. The joint is much strengthened by a large number of surrounding muscles, some of which are of considerable power.

In such a joint as this, although the ligaments materially assist in preventing dislocation, it is obvious that the articular surfaces cannot, under ordinary circumstances, be kept in apposition by them, inasmuch as they must be loose in their whole circumference, to permit of the general movements of the joint. The experiments of Weber show that atmospheric pressure is the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest. "One convincing experiment is easily repeated—that, namely, of holding up a side of the pelvis, with its appended lower extremity, the joint not having been opened, and then boring a hole through the acetabulum, so as to admit air into the joint, when the weight of the limb will cause it to drop from half an inch to an inch, the head of the thigh-bone being pulled out of

the acetabulum as soon as the air is permitted to pass between the articular surfaces."—Humphry *On the Human Skeleton*, p. 74.

DISEASE OF THE HIP-JOINT. Hip-disease differs in so many points of importance from other joint-diseases, and is so serious an affection, that it requires a special notice. Its connection with scrofula is more distinctly marked than that of most other joint-diseases, and it almost always occurs before the age of puberty. It comes on, in children or young persons of a scrofulous constitution, from very slight causes; thus, it is often traced to over-exertion in a long walk, a sprain in jumping, or a fall; and in many cases no apparent cause can be assigned.

In the early stage of the disease the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint, and often communicate with its interior; and the acetabulum, and the head and neck of the thigh-bone, become disintegrated, softened, and gritty. In a still more advanced stage, dislocation of the head of the thigh-bone commonly occurs, either from the capsular ligament becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity, and pushing the head of the bone before it.

It is of extreme importance that the symptoms should be detected in an early stage of the disease; and on the least suspicion of this joint being affected, surgical aid should at once be sought.

As the disease advances, abscesses (as already mentioned) occur around the joint, which sometimes, from the tension they exert on the obturator nerve, occasion extreme pain in the inside of the thigh. True shortening of the limb now takes place, which at the same time becomes adducted and inverted. From this stage, if the health is pretty good, and the lungs are sound, the patient may be so fortunate as to recover with an anchylosed (or immovable) hip-joint; but the probability is that exhaustion and hectic will come on, and that death will supervene, from the wasting influence of the purulent discharges occasioned by the diseased bone.

The duration of the disease may vary from two or three months to ten or more years.

As the treatment must be left entirely in the hands of the surgeon, it is unnecessary to say more than that the most important points are *perfect rest* to the affected part, which may be secured by a strong leather splint, or by a starch bandage, the internal administration of cod-liver oil and tonics, and the application of counter-irritation by means of an issue behind the great trochanter.

HIP-KNOB, an ornament carved in stone or wood, set on the apex of a gable or hipped roof, and forming a kind of finial (q.v.).

HIPPAR'CHUS, the first systematic astronomer on record, was born, according to Strabo, at Nicæa, in Bithynia, about the beginning of the 2d c. B.C. Of his personal history, nothing is known. According to Fabricius, Hipparchus wrote nine separate works, of which only the last and least important, *A Commentary on Aratus*, has come down to us. The other works treated of astronomy and geography. The only authority we have regarding the discoveries made by Hipparchus is the *Syntaxis* of Ptolemy, and from it we learn that Hipparchus discovered the "precession of the equinoxes," determined the place of the equinox among the stars, established the solar and lunar theories, invented the astrolabe (q.v.), and drew up a catalogue of upwards of 1000 stars, determining the longitude and latitude of each. As Ptolemy was also an astronomer, there is some difficulty in allotting to each his meed of praise for the discoveries mentioned in the *Syntaxis*, which difficulty has given rise to much discussion, resulting in favor of the claims of Hipparchus. See Delambre's *Histoire de l'Astronomie Ancienne* (Paris, 1817).

HIPPARION, an extinct animal belonging to the horse family, and regarded by several modern naturalists as one of the links in the chain of evidence which supports the theory of the progressive development of creation, or the Darwinian doctrine of evolution. See HORSE, FOSSIL.

HIPPO, or HIPPO REGIUS, a city of Numidia, of which the ruins are yet to be seen, near the gulf of Bona, Algeria. Hippo was the residence of the rulers of Numidia, and in later years the see of St. Augustine. The Vandals destroyed the town in 431 A.D.

HIPPOBOSCIDÆ. See FOREST FLY and SPIDER FLY.

HIPPOCAM'PUS, a genus of osseous fishes, of the order *lophobranchii* (q.v.), and of the family *syngnathidæ* (see PIPE-FISH), by some naturalists made the type of a separate family, *hippocampidæ*, remarkably distinguished by the prehensile tail, which is tapering, and quite destitute of fin. The species, which are not very numerous, but some of which are found in the seas of all parts of the world, are fishes of very extraordinary form and habits. They have the jaws united and tubular, as in the pipe-fishes; the body compressed, short, and deep; the whole length of the body and tail divided by longitudinal and transverse ridges, with tubercles at their intersections. The scales are ganoid, clothing the whole body in a kind of armor. The males have pouches on the

tail, in which the eggs are carried till they are hatched. From their appearance, these fishes have received the name of SEA-HORSE. They swim in a vertical position, and are always ready to entwine their tails around sea-weeds, or even with one another. They are very interesting objects in an aquarium. One species, *H. brevirostris*, is occasionally found on the shores of Britain, particularly in the south.—Hippocampus in the Grecian mythology was a sea-horse—half fish, half horse—which served Poseidon (Neptune).

HIP'POCRAS, an aromatic medicated wine, formerly much used in this country, and still employed on some parts of the continent. The following was the method of preparing it: Twelve pints of Lisbon were mixed with an equal quantity of Canary wine. Bruised spices of various kinds were digested in the wine for three or four days, after which it was strained, and two pounds and a half of lump-sugar were added. It was doubtless an admirable cordial.

HIPPOC'RATES, the most celebrated physician of antiquity, was the son of Heraclcides, who was also a physician, and belonged to the family of the Asclepiadæ, the subject of the present notice being either the 19th or the 17th in descent from Æsculapius. His mother, whose name was Phænarete, was said to be descended from Hercules. He was born in the island of Cos, probably about the year 460 B.C. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Gorgias of Leontini, the celebrated sophist, and Democritus of Abdera, whose cure, when affected by madness, he afterwards effected. After spending some time in traveling through different parts of Greece, he settled and practiced his profession at Cos, and finally died at Larissa, in Thessaly. His age at the time of his death is uncertain, and is stated by different ancient authors to have been 85, 90, 104, and 109 years. Clinton (*Fasti Hell.*) places his death 357 B.C., at the age of 104. We know little more of his personal history than that he was highly esteemed as a physician and an author, and that he raised the medical school of Cos to a very high reputation. His works were studied and quoted by Plato. Various stories are recorded of him by Greek writers, which are undoubtedly fabulous, and to which it is therefore unnecessary to advert; and we find legends regarding him in the works of Arabic writers, who term him "Bokrát," while the European story-tellers of the middle ages celebrate him under the name of "Ypocras," and, in defiance of chronology, make him professor of medicine at Rome, with a nephew of wondrous medical skill, whom he dispatched in his own stead to the king of Hungary.

The works bearing the name of Hippocrates, and termed the Hippocratic collection, are more than 60 in number, and, as Dr. Greenhill observes in his article on Hippocrates in Smith's *Dictionary of Greek and Roman Biography*, etc., "the classification of these, and assigning each (as far as possible) to its proper author, constitutes by far the most difficult question connected with ancient medical writers." Dr. Greenhill divides the Hippocratic collection into eight classes, of which we need specify only two. (For convenience, we give the Latin instead of the Greek titles.)

Class I.—Works *certainly* written by Hippocrates, containing *Prognostica; Aphorismi; De Morbis Popularibus; De Ratione Victus in Morbis Acutis; De Aëre, Aquis, et Locis;* and *De Capitis Vulneribus.* Some eminent critics doubt the genuineness of some portions of the *Aphorismi*, the work by which Hippocrates is most popularly known.

Class II.—Works *perhaps* written by Hippocrates. These are 11 in number, and one of them is the well-known *Jusjurandum*, or "Hippocratic Oath."

The others consist of works written before Hippocrates; works whose author is conjectured; works by quite unknown authors; and willful forgeries.

For anything like a full account of his views, we must refer to the various writers who have treated of the history of medicine. We can here only mention that he divides the causes of disease into two principal classes: the first consisting of the influence of seasons, climates, water, situation, etc.; and the second of more personal causes, such as the food and exercise of the individual patient. His belief in the influence which different climates exert on the human constitution is very strongly expressed. He ascribes to this influence both the conformation of the body and the disposition of the mind, and hence accounts for the differences between the hardy Greek and the Asiatic. The four fluids or humors of the body (blood, phlegm, yellow bile, and black bile) were regarded by him as the primary seats of disease; health was the result of the due combination (or *crasis*) of these, and illness was the consequence of a disturbance of this crasis. When a disease was proceeding favorably, these humors underwent a certain change (or *coction*), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or *crisis*, these crises having a tendency to occur at definite periods, which were hence called "critical days." His treatment of diseases was cautious, and what we now term expectant; it consisted chiefly and often solely in attention to diet and regimen; and he was sometimes reproached with letting his patients die by doing nothing to keep them alive.

The works of Hippocrates were translated at an early period into Arabic. They were first printed in a Latin translation in 1525 at Rome. The first Greek edition (the Aldine) appeared the following year at Venice; an edition by Mercurialis appeared in 1588, one by Foësius in 1595, and one by Van der Linden (still much esteemed) in 1665. Other editions have appeared under the editorship of Chartier, Kühn, etc. The latest,

and incomparably the best edition, is that of Littré, in 10 volumes, the first of which appeared in 1839, and the last in 1861. An edition by Ermerins, with a Latin translation, is now in course of publication at Utrecht, at the expense of the university of Amsterdam. The Latin title runs as follows: *Hippocratis et aliorum Medicorum veterum Reliquiæ. Edidit Franciscus Zacharias Ermerius.* The first three volumes appeared between 1859 and 1863. An excellent English translation of *The Genuine Works of Hippocrates* was published in 1849 in 2 vols., by Dr. Adams. The admirable French translation by M. Littré (1839–61) is in 10 vols.

HIPPOCRATIC OATH, a formula ascribed to Hippocrates, and taken by persons entering the medical profession. By this oath they promised fealty to the profession and general good conduct in their lives. It is not dissimilar to the oaths of masonic and other societies at the present time.

HIPPOCRE'NE (derived from *hippos*, a horse, and *krēnē*, a fountain) is a fountain on Mt. Helicon, about 20 stadia above the grove of the muses, and, according to the mythical account, was produced by a stroke from the hoof of the horse Pegasus (q.v.). It was sacred to the muses. In modern times, some have attempted to identify it with a fine spring at Makariotissa, and this opinion is most probably correct. See HELICON.

HIPPODAMI'A, the beautiful daughter of Œnomaus, king of Pisa, in Elis, and the pleiad Asterope. It had been predicted to her father that he should be slain by his future son-in-law; he therefore stipulated that every suitor of his daughter should run a chariot-race with him. and that death should be the consequence of defeat. Thirteen, or, as some say, seventeen suitors had already been conquered and slain, when Pelops came to Lydia. Pelops bribed Myrtilus, the king's charioteer, and thus succeeded in reaching the goal before Œnomaus, who in despair killed himself. Hippodamia became the wife of Pelops, and the mother of Atreus and Thyestes. She afterwards destroyed herself from grief at being reproached with having led her sons to murder each other.

HIPPODROME (Gr. *hippos*, a horse, and *dromos*, a race-course), the Greek name for the place set apart for horse and chariot races. Its dimensions were, according to the common opinion, half a mile in length and one-eighth of a mile in breadth. In construction and all important points of arrangement, it was the counterpart of the Roman circus (q.v.), with the exception of the arrangement of the chariots at the starting-place. In the hippodrome, the chariots were arranged so as to form two sides of an isosceles triangle, with the apex towards the goal and a little to the right side. But as this would have given the chariots on the left side a longer course than those on the right, the hippodrome was constructed with the right side longer than the other. The start was effected by setting free the chariots on the extreme right and left, and when they came opposite the next two, by setting them free also, and so on till all were in motion. The hippodrome was also much wider than the Roman circus, to allow room for the greater number of chariots, for though we have no precise information as to the number that usually started in one race, we know that Alcibiades on one occasion sent seven; Sophocles mentions ten chariots as competing at the Pythian games; and the number at the Olympic games must have been considerably greater. There is a beautiful description of a chariot-race in Homer (*Iliad*, xxiii. 262–650). The golden age of the hippodrome was during the lower Greek empire. The blue and green factions in the hippodrome carried their animosity into all departments of the public service, and laid the foundation of that perpetual disunion which rendered the Byzantine empire a prey to every aggressor.—The term hippodrome has been given to a circus constructed in 1845 at Paris, and also to a large field in the plain of Longchamp, near Boulogne, used as a race-course.

HIP'POGRIFF, or HIPPOGRYPH (Gr. *hippos*, a horse, and *gryph-*, griffin), a fabulous animal, which has been represented as a winged horse, with the head of a griffin. The hippogriff figures largely in the *Orlando Furioso* of Ariosto.

HIPPOL'YTUS, the name of several saints and martyrs of the early church, among whom the chief interest is concentrated upon one who is believed to have flourished in the early part of the 3d c., to have been bishop of Portus, near Rome, and to have suffered martyrdom under Alexander Severus. All the facts connected with the history of this saint have long been the subject of much doubt and controversy; and the interest of the discussion has been much heightened of late years by the discovery of a very curious and important work, certainly of the age of the supposed Hippolytus, and calculated, if a genuine work of that author, to throw a most curious light upon the early history of the church. The work in question was one of several Greek MSS. obtained at Mt. Athos in 1842, by M. Menas, an agent of the French government, and was published in 1851, at the expense of the university of Oxford, to which it was recommended as a work of exceeding interest for the history of the early church, by M. Emmanuel Miller, who undertook the task of editing it. M. Miller published it as a work of Origen, under the title of *Origenis Philosophumena*. The late baron Bunsen was the first to conjecture that the true author was Hippolytus, but he was mistaken as to the particular work of Hippolytus which he took it to be; and for a time the question of the authorship remained in much uncertainty. Some critics still adhered to the opinion that the author was Origen; some ascribed the work to the Roman priest Caius; others,

again, to Tertullian; and others, in fine, to some unknown Novatian heretic. The result of the discussion, however, seems to be that although Bunsen was mistaken in supposing this treatise to be a work of Hippolytus, which Photius has described as a "*little treatise* against heresies," by that author, yet it is in reality a *larger treatise* on the same subject and by the same author.

There still remained, however, a further question, namely, Who is the Hippolytus who is to be regarded as the author? Without reckoning many later saints of that name, Dr. Döllinger, in his *Hippolytus und Kallistus*, enumerates at least six contemporaneous, or nearly contemporaneous, with the supposed Hippolytus of Portus. It must suffice to state that although not absolutely certain, the opinion that the author of the *Philosophumena* was the Hippolytus already known in the ancient church as a writer and as a martyr, has met with almost universal acceptance.

From the autobiographical details contained in the treatise, added to the particulars already known, we learn that this Hippolytus, the time and place of whose birth are uncertain, was, about the year 218, bishop of Portus, near Ostia, a suburban see of Rome, and as such, a member of the ecclesiastical council of that city. This fact receives a very decisive confirmation from a statue discovered in Rome in 1561, inscribed with the name of Hippolytus, the title of his see, "Portuensis," and the paschal cycle of which Hippolytus is known to have been the author. In the persecution of Maximin, 235, Hippolytus was exiled to the island of Sardinia, from which he was permitted soon afterwards to return; but in a new outbreak of the persecution, he was put to death, probably in 238. Probably, from the connection of his see with the Roman church, Hippolytus took an active part in the affairs of that church, and placed himself in violent opposition to the bishop Callistus, whom he denounces in the treatise in the most unmeasured terms, both as to his private character and his public administration, as a person of most disreputable antecedents, as well as criminally lax in the government of the church, and especially in the administration of penance, after his election to the see. The tone which he adopts toward the Roman bishop, indeed, is so disrespectful as to appear to the Protestant critics a clear and conclusive evidence that, in the church of the 3d c., that bishop cannot have possessed the supremacy which the advocates of the papal pretensions ascribe to him. It is difficult, in truth, to conceive any bishop in the modern Roman system addressing the pope in such terms as those which Hippolytus applies to Callistus.

The Roman Catholic critics reply that the very violence of the language employed, and the unscrupulous nature of the imputations, contain their own refutation; and they contend that no argument can be founded on Hippolytus's opposition to the authority of the Roman bishop, inasmuch as not only the opinions expressed in this very treatise, but also the direct testimony of Prudentius (hymn xi. v. 170–180), show him to have been tainted with the Novatian heresy, or rather, although somewhat earlier, with the same opinions which in Novatus were condemned as heretical, and which eventuated in the Novatian schism. The validity of this plea, however, is strongly controverted by Bunsen. The works of Hippolytus, which are numerous, and which comprise dogmatical, exegetical, ascetic, and chronological treatises, were first published in a collected form by Fabricius, at Hamburg, 1716–18. They are also found in the second volume of Gallandus.—See Bunsen's *Hippolytus and his Age* (1852; 2d ed. 1854); Miller's *Origenis Philosophumena* (Oxford, 1851); Döllinger's *Hippolytus und Kallistus* (Regensburg, 1853); Wordsworth's *St. Hippolytus and the Church of Rome in the Third Century* (Lond. 1853).

HIPPOL'YTUS, in Grecian mythology, the son of Theseus whose stepmother fell in love with him and accused him to his father because he was indifferent to her. Theseus caused Hippolytus to be murdered; but afterwards learned that he was innocent, whereupon the stepmother, the wicked Phædra, took her own life. The Romans asserted that Hippolytus was restored to life and was worshiped under the name of Virbius.

HIP'POMANE. See MANCHINEEL.

HIPPONAX, OF EPHESUS, a poet placed third, after Archilochus and Simonides, among the classic iambic poets of Greece. Expelled from Ephesus 540 B.C. by the tyrants Athenagoras and Comas, he took refuge in Clazomenæ. There his deformed figure and malicious disposition exposed him to the caricature of the Chian sculptors Bupalus and Athenis; and he revenged himself by issuing against them a series of bitter satires. These are in thought and execution much inferior to the similar works of his predecessor, Archilochus. His coarseness of thought and feeling, his rude vocabulary, his want of grace and taste, and his numerous allusions to matters of merely local interest, prevented his becoming a favorite in Attica. He invented epic parody, and the four opening lines of a parody on the *Iliad* have been preserved in Athenæus (xv. 698 B). He was also the inventor of a peculiar meter, used after him by many writers, known as the scazon or choliambus, which substitutes a spondee for the final iambus of an iambic senarius. [From *Encyc. Brit.*, 9th ed.]

HIPPOPHAË. See SALLOW-THORN.

HIPPOPH'AGI ("eaters of horse-flesh," from Gr. *hippos*, a horse, and *phagein*, to eat), according to the accounts of the old geographers, were a Scythian people, living n.e.

of the Caspian sea, where roam, at the present day, the Kalmuck hordes, who, retaining all the peculiarities of the old Scythians, still regard horse-flesh as a dainty. In Europe repeated attempts have been made in modern times to introduce the practice, but a public *taste* for horse-flesh has not yet been created, except partially in France.

HIPPOPH'AGY (Gr. *horse-eating*). The adoption of horse-flesh as food for man has at various times occupied the attention of physicians. That semi-civilized nations eat horse-flesh is well known. Witness Sir John Chardin's account of the Crim-Tartars. In Spain, a banquet, comprising roasted horse-flesh among the viands, was given in the time of Charles V.; and foal's flesh is eaten in some of the hill districts at the present day.

In 1855 and 1856 there was a good deal of discussion in Paris relative to the formal introduction of horse-flesh into the meat-markets. M. Geoffrey St. Hilaire delivered a lecture declaratory of the wholesome character of this food; and some of the more enthusiastic advocates of the plan formed themselves into a so-called hippophagic, or horse-eating society. The French are famous for their skill in so modifying the operations of cookery as to obtain as many varieties of flavor as possible with any and every kind of meat; and this skill was exercised abundantly in disguising (if not removing) the somewhat coarse taste and odor of horse-flesh. The journals of the time spoke of banquets held by the hippophagi, in which the principal dishes were horse-flesh, variously cooked and diversified.

In 1866 there was official recognition of the introduction of this kind of food into the market, under such restrictions as were deemed suitable. According to a statement in the *Journal of the Society of Arts*, the prefect of the Seine issued an ordonnance in June of that year, recognizing horse-flesh as human food, establishing special slaughter-houses or abattoirs for it, and laying down detailed regulations. No ordinary horse-slaughterers, but only those specially appointed, are to engage in the trade. The animals are to be killed in presence of a veterinary inspector, who is also to stamp or seal every distinct joint of meat after inspection. Unhealthy horses are excluded from the supply; they may be old, and worn out for work, but still healthy (the supply mostly comes from Normandy). All restaurateurs who use horse-flesh in their potages, bouillis, etc., are to acquaint their customers distinctly with the fact. Within a few weeks after the issue of the ordonnance, there were establishments for horse-flesh bouilli and soup, and others for horse-flesh sausages, in Paris, avowedly sanctioned by the authorities. The decision pronounced upon the better portion of horse-flesh, by the medical men of Paris, is that it bears some such relation to ox-beef as brown bread does to wheaten—quite as wholesome, but not so pleasant in taste. During the French international exhibition of 1867 some of the humbler restaurants of Paris made great use of horse-flesh; so that when, during the siege of Paris in 1870–71, horse-flesh was so extensively used as food, it was by no means a novelty to the Parisians.

In London a dinner was given, in 1868, to 160 guests at the Langham Hotel, to test the qualities of horse-meat. It was devised by Mr. Bicknell, cooked by M. Castel, and presided over by Mr. Forsyth, Q.C. Known by their French names, the horse element in the dishes comprised "consommé de cheval," "huile hippophagique" (as a sauce for sole), "terrines de fois maigre chevalines," "saucissons de cheval," "aloyau de cheval farci," "culotte de cheval braisée," "petits pâtés à la möelle Bucéphale," "poulets garnis à l'hippogriffe," "langues de cheval," "gelée de pied de cheval au Marasquin," "zéphirs sautées à l'huile chevaleresque," "gâteau vétérinaire." Under plain English names were collared horse-head, a baron of horse (weighing 280 lbs.), and boiled withers. In most of the French dishes the taste of horse was almost hidden by condiments, etc., but in the baron it was left nearly unchanged—something between beef and venison. The best was done that could be done; but hippophagy does not seem to be any more popular in England than before that experimental banquet was given.

During 1866 and 1867 the Parisians did not avail themselves largely of the official permission to establish abattoirs and shops for the sale of horse-flesh; but by the beginning of 1868 there were twenty butchers' shops in which nothing but horse-flesh was sold; and thus the sale had become considerable, at prices far below that of beef. During the siege of Paris by the Germans, in the later weeks of 1870 and early in 1871, the magnificent halles centrales displayed more horse-flesh than any other kind of food. Horse-broth formed the basis of all the soups, even at the most expensive hotels and restaurants. A horse-steak at an ordinary restaurant was charged four francs.

There has been something achieved also in France in feeding poultry with this kind of diet. One establishment was described, in 1864 (in the *Journal* above quoted), as covering 30 acres, furnishing accommodation for 100,000 pullets at one time. The horses were slaughtered in abattoirs built for the purpose; the hides, hoofs, heads, marrow, bones, hair, intestines, tendons, and blood were sold to various manufacturers; the flesh was boiled, and chopped into small pieces as poultry food, and the refuse was valuable as a rich manure.

HIPPOPOT'AMUS (Gr. *river-horse*), a genus of pachydermatous quadrupeds, constituting a family by itself, and of which, until very recently, only one species was known as now existing, although the fossil remains of others indicate the greater abundance and wider distribution of the form in other periods of the earth's history. The largest

and best known species, *H. amphibius*, is—or, within historic periods, has been—found in almost all parts of Africa, to which quarter of the globe it is entirely confined. A smaller species, *H. Liberiensis*, has recently been described as an inhabitant of the rivers of western Africa within the tropics, and is said to differ remarkably from the common species, and from all the fossil species, in having only two incisors, instead of four, in the lower jaw. The common hippopotamus is one of the largest of existing quadrupeds, the bulk of its body being little inferior to that of the elephant; although its legs are so short that its belly almost touches the ground, and its height is not much above five feet. It is extremely aquatic in its habits, living mostly in lakes or rivers, often in tidal estuaries, where the saltness of the water compels it to resort to springs for the purpose of drinking, and sometimes even in the sea, although it never proceeds to any considerable distance from the shore. Its skin is very thick—on the back and sides more than 2 in.; it is dark brown, destitute of hair, and exudes in great abundance from its numerous pores a thickish oily fluid, by which it is kept constantly lubricated. The tail is short. The feet have each four toes, nearly equal in size, and hoofed. The neck is short and thick. The head is very large, with small ears, and small eyes placed high, so that they are easily raised above water, without much of the animal being exposed to view. The muzzle is very large, rounded, and tumid, with large nostrils and great lips concealing the large front teeth. The hippopotamus cuts grass or corn as if it were done with a scythe, or bites with its strong teeth a stem of considerable thickness neatly through. The skull, while it is distinguished by remarkable peculiarities, corresponds in the most important characters with that of the hog. The respiration of the hippopotamus is slow, and thus it is enabled to spend much of its time under water, only coming to the surface at intervals to breathe. It swims and dives with great ease, and often walks along the bottom, completely under water. Its food consists chiefly of the plants which grow in shallow waters, and about the margins of lakes and rivers; and it probably renders no unimportant service in preventing slow streams from being choked up by the luxuriance of tropical vegetation, the effect of which would, of course, be an increase of the extent of swampy land. It often, however, leaves the water, chiefly by night, to feed on the banks, and makes inroads on cultivated fields, devouring and trampling the crops. It is a gregarious animal, and the havoc wrought by a herd of twenty or thirty is very great; so that wherever cultivation extends, war is waged against the hippopotamus, and it disappears from regions where it formerly abounded. Thus it is no longer found in Lower Egypt, although still abundant further up the Nile. It is taken in pits, which are digged in its usual tracks; it is killed by poisoned spears, is pursued by means of canoes, is harpooned, and is shot with the rifle. The flesh is highly esteemed; the fat, of which there is a thick layer immediately under the skin, is a favorite African delicacy, and when salted is known at the cape of Good Hope as *zee-koe speck*—that is, lake-cow bacon. The tongue, and the jelly made from the feet, are also much prized. The hide is used for a variety of purposes, and the great canine teeth are particularly valuable as ivory, and are a very considerable article of African commerce.

The hippopotamus is lively and playful in its native waters; it soon learns to avoid man, and when it cannot retire among reeds for concealment, it dives and remains long under water, raising only its nose to the surface when another breath becomes necessary. The female hippopotamus may sometimes be seen swimming with her young one on her back. The hippopotamus is generally inoffensive, but is occasionally roused to fits of rage, in which it becomes extremely dangerous, particularly to those who pursue it in boats. The voice of the hippopotamus is loud and harsh, and is likened by Burckhardt to the creaking and groaning of a large wooden door. That the hippopotamus is capable of being tamed, and of becoming much attached to man, has been sufficiently proved by the instances of living specimens in London and Paris. The first hippopotamus brought to Europe in modern times, a young one from the Nile, arrived in London in 1850. The hippopotamus, however, sometimes appeared in the spectacles of the ancient Romans. It is very generally supposed to be the behemoth of the book of Job.

Fossil species.—Some six species of hippopotamus have been described from the later tertiary strata—the pliocene and pleistocene of Lyell. They occur in fresh-water marls, and in the bone-caves, into which they had been carried for food by the carnivorous animals that used the caves as dens. One species found in England, and in considerable abundance in the southern countries of Europe, was of a size as much greater than the living species, as its companion, the mammoth, was greater than the living elephant.

HIPPOTHE'RIUM. See HIPPARION.

HIPPU'RIC ACID ($C_{18}H_8NO_5,HO$) is a compound of great interest both to the chemist and to the physiologist. It derives its name from its having been first discovered in the urine of the horse, and that fluid, or the renal secretion of the cow, affords us the best and readiest means of obtaining it. The crystals of hippuric acid are moderately large, colorless, but subsequently becoming milk-white, four-sided prisms, which are devoid of odor, but have a faintly bitter taste. They dissolve readily in boiling water and in spirit, but are only sparingly soluble in cold water and in ether.

Its chemical bearings show that hippuric acid is intimately associated with benzoic acid on the one hand, and with glycine (or glycocol) on the other. The acid is a product of the metamorphosis of the bodily tissues, especially of herbivorous animals. It is a normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, etc., and most probably is to be found in the urine of all vegetable feeders. In the human urine of healthy persons living on an ordinary mixed diet it occurs in very small quantity, but it is increased by an exclusively vegetable diet, and in the well-known disease diabetes.

Although hippuric acid usually occurs in mere traces in human urine, we can artificially produce it at will in the body, and cause it to be eliminated in comparatively large quantity by the kidney. If we swallow benzoic acid, it seems to take up glycine or the elements of glycine in its passage through the system, and thus to form hippuric acid, which appears abundantly in the urine. The hippuric acid occurring in the animal organism exists in combination with bases, and chiefly as hippurate of soda and hippurate of lime. The last-named salt can be obtained by the mere evaporation of the urine of the horse.

HIPPURITES, a very remarkable genus of fossil bivalve shells, peculiar to the cretaceous strata, and so abundant in some of the lower chalk beds of the Pyrenees and other places, that the series has received, from some continental geologists, the name of hippurite limestone. The external form of the shell is so anomalous, that the genus has been tossed about by naturalists in an extraordinary manner; some have called it a coral, others an annelid, others a balanus, but the majority hold it to be a mollusk, differing, however, among themselves whether it is a brachiopod, a conchifer, or a cephalopod. The true relation of the genus has been lately determined by Mr. S. P. Woodward, who has published a full description of its curious and anomalous structure in the *Journal of the Geological Society*, vol. xi. p. 40. He has shown that it is a lamellibranchiate mollusk. The lower and fixed valve is produced and tapering, in some species reaching a length of more than a foot. On the one side are three furrows, representing the siphonal, muscular, and ligamental inflections of the shell. The upper and free valve formed a flat covering to the large lower valve. Sixteen species have been described.

HIRAM, a village in Portage co., Ohio, on the Atlantic and Great Western railroad; 33 m. s.e. of Cleveland; pop. of township, 1234. The village is the seat of Hiram college.

HIRAM (Heb. *Chiram*, high-born), King of Tyre, and contemporary with David and Solomon. He was David's friend and ally, and assisted him in the building of his palace with contributions of timber and labor. He also sent cedar and other timber, and skilled workmen for the building of the temple, and gave 500 talents for its adorning, being offered in return 20 towns in Galilee, which, however, he refused to accept. Later Jewish writers say that, because Hiram was a God-fearing man and helped the building of the temple, he was received alive into paradise; but after he had been there a thousand years he sinned through pride, and was cast into hell. Another Hiram, son of a widow of the tribe of Dan, is conspicuous in masonic traditions.

HIRING is a contract by which one employs, for a limited time, another's property or labor for some consideration or reward. Where the thing hired is land or houses, see LANDLORD AND TENANT. In the Roman law, hiring was divided into—1. *Locatio rei*, or the hiring of a thing; 2. *Locatio operis faciendi*, or the hiring of work and labor; 3. *Locatio custodiæ*, or the hiring of care and services to be performed or bestowed on the thing delivered; 4. *Locatio operis mercium vehendarum*, the hiring of the carriage of goods from one place to another. These phrases are still sometimes employed both in the law of England and Scotland, but the subjects are more conveniently treated under other heads: see INN, LODGINGS, SERVANTS, CARRIERS, SHIPPING. The only branch of the subject which seems to fall properly under this head is the hiring of task-work or job-work. Sometimes it is difficult to establish a contract of this kind, but in general there must be either an express or implied contract to pay for the services. Thus, if A, seeing B's horse running away, at some expense catches it, and brings it back to B, there having been no contract or engagement on B's part to pay, he is not bound to pay A for his services, however beneficial they have been, nor can A keep B's horse till such expenses are paid. So, if B has deposited a chattel with A, who has incurred extraordinary expense in preserving it, B is not bound to pay anything. In the Roman law, however, and in the law of Scotland, A could keep the horse or chattel till he was repaid his expenses, or he could sue B for these. In England, however, there must at least be some implied request or contract. When a person is hired to do a thing in a given time, and takes much longer, or deviates from the contract, he is nevertheless entitled to be paid for his services, for the contract is not rescinded on these grounds, unless there was an express stipulation to that effect. During the progress of the contract, it is sometimes material to know which of the parties bears the loss in case of fire. It is difficult to lay down the rule in such cases, for everything depends on the nature of the contract. Whoever is the owner, in law, of the material at the time, bears the loss of it by an accidental fire. If, for example, a tailor engage to make a coat and to furnish the materials for a fixed sum, this is, in fact, two contracts—viz., a sale of the materials, and also work and labor bestowed on them; and in case of destruc-

tion of the subject before completion, the loss of the materials falls on the hirer, and the loss of the labor falls on the workman. So if a printer engaged for a fixed sum per sheet to print and complete a book, the hirer would bear the accidental loss of the paper, and the printer the loss of his labor and skill. Much, however, depends in all these cases on the terms of the contract. Where a workman engages to do work, he impliedly warrants to have reasonable skill: otherwise, if the work is useless, he cannot recover his money. In the case of robbery while goods are in the hands of a workman to work up, if the robbery resulted from his negligence, he bears the loss. So if he merely lost it. In case of a horse or chattel being hired, and accidental damage done, the *onus* in England lies on the owner to prove negligence in the hirer; but in Scotland the contrary rule prevails, and it lies on the hirer to prove he used due care.

HIRING (*ante*), in the United States, is a simple contract to do a certain thing for compensation, and all such transactions come under the legal regulations concerning contracts. If the party hiring out is incompetent, or neglectful, or loses or wastes property, wages may be withheld and discharge may ensue. In most of the states a person breaking a contract for service without reasonable cause can recover nothing, but in some states he can recover the actual value of his service. In case of a discharge before the end of the contracted time, if the person discharged is ready to perform the specified duty he can recover pay for the full period. In the hiring of chattels the person hiring is bound to use all reasonable care for the preservation of the article hired. He cannot dispose of it, for a mere hiring does not convey a title. If the hirer uses the article or animal for purposes not contemplated in the hiring, the owner may repossess and perhaps recover damages. In a general way it may be accepted that the obligations of the one who hires a thing and the one who lets it are on the basis of a plain contract, and it is understood that the purposes, services, and compensation have previously been agreed upon.

HIRPINI, a people of Italy who inhabited the s. portion of Samnium. They have been considered by some authorities as merely a Samnite tribe, while by others they are looked on as an independent nation. The country they inhabited was the wild and mountainous district traversed by the Sabatus, Calor, and Tamarus, tributaries of the Vulturnus, and on the e. side of the Apennine ridge, the upper course of the Aufidus. In the early history of Rome the Hirpini are found identifying themselves with their Samnite neighbors against their common foes. They seem to have been subdued in the early part of the 3d c. B.C., as in 268 B.C. Beneventum, the key of all their military positions, was colonized by Roman settlers. They appear in history for the first time as an independent people after the second Punic war. Revolting from their old conquerors, they joined the Carthaginian invaders, and though they were unable to recapture their stronghold of Beneventum, they remained faithful to Hannibal till the defeat at the Metaurus restored the empire of Italy to his opponents. In the year of that event the Hirpini made peace with their old masters by betraying into their hands the garrisons of their allies. From this time till the outbreak of the social war, the Hirpini seemed to have continued steadfast in their allegiance. On that occasion, however, they set the example of revolt to the allies, and might have become formidable enemies, had not the rapid successes of Sulla induced them to repair their error by a complete submission. At the close of this war the Hirpini obtained the franchise, and do not again appear in history as an independent people. Their chief towns were Beneventum, Aeculanum, Trivicum, Equus, Tuticus, Murgantia, and Aquilonia.

HIRSCH'BERG, an important manufacturing t. of Prussia, in the province of Silesia, is romantically situated at the foot of a mountain, and at the confluence of two streams, the Bober and the Zacken, 30 m. s.w. of Liegnitz. The town is ancient, and is still girt about by a double line of walls. Its Protestant church, a Gothic edifice, is worthy of mention for its beauty, its magnitude, and its excellent organ. Hirschberg is the center of the extensive linen and other manufactures of the district. Pop. '75, 12,970.

HIRST, HENRY B., 1813–74; b. Philadelphia; became a lawyer and for some time a merchant, but better known as a writer of verses. He published *The Coming Mammoth, the Funeral of Time; Endymion, a Tale of Greece;* and *The Penance of Roland, and other Poems.*

HIRTIUS, AULUS, 90–43 B.C.; a personal friend of Julius Cæsar, under whom he served in Gaul, and who, in 46 B.C., nominated him as one of the 10 prætors. After the death of Cæsar he became consul, declared against Antony, and headed a reinforcement for Octavius. While leading an assault he was killed. It is said that he was the author of the eighth book of Cæsar's *Commentaries on the Gallic War.*

HISPA'NIA, the name by which Spain was known to the Romans. According to W. von Humboldt, it is only a modified form of the original name, which he derives from *Expaña*, a Basque word, meaning a "border," or "limit," and which he understands to imply that the country formed the margin of Europe towards the Western ocean. Of the other ancient names of the country, the chief are *Iberia*—the common designation among the Greeks, and believed to denote specially the region of the Iberus (modern Ebro)—and *Hesperia*, on account of its western situation.

Little definite or accurate knowledge of Hispania was possessed before the time of

the Romans. The conquests of the Carthaginians first excited the alarm of the Romans, and led to the struggle on Spanish soil of these two great rivals. The triumph of the Romans, as every reader knows, was ultimately complete, and for the next two or three centuries these indefatigable conquerors set themselves to the thorough subjugation of the whole country. This was finally effected in the time of Augustus, who also founded many Roman cities, adorned with splendid architecture, such as Cæsar Augusta (*Zaragoza*), Emerita Augusta (*Merida*), Pax Julia (*Beja*), Pax Augusta (*Badajoz*), Legio VII. Gemina (*Leon*), etc., and completed the system of military roads across the peninsula, begun 124 B.C. Great numbers of Romans then flocked into the country, and settling there, mixed with the native Iberi, some of whom completely adopted Roman habits, and were spoken of as *Togati*.

To what stock of the human family the old Iberi of Hispania belonged, is one of the *quæstiones vexatæ* of scientific ethnography. That they are now represented by the Basques (q.v.) is universally admitted. Niebuhr holds that Hispania was originally peopled by Celts and Iberi, from a mixture of whom arose the *Celtiberi* (q.v.). The more common opinion, however, both ancient and modern, is that the Celts were not equally aboriginal with the Iberi, but invaders from Gaul, who conquered the latter.

HISPANIOLA (Little Spain). See DOMINGO, SAN, and HAYTI.

HISSAR, the capital of a district of that name in the Punjab, about 100 m. N.W. of Delhi. Pop. '68, 14,133. The district of Hissar has an area of 3,540 sq.m., and its fertile soil produces wheat and other cereals in abundance. Pop. 484,681.

HISTIÆ'A, or OREUS, in ancient geography, an important city of Eubœa, on the N. extremity of the island, and giving name to the district Histiæotis. It was very ancient, and, like most of the old cities of Greece, its origin is doubtful and obscure. At the final expulsion of the Persians from Greece, it passed into the hands of the Athenians, and when Eubœa revolted from that people and was again subdued, the old inhabitants of the town were expelled, and 2,000 Athenian colonists settled in their stead. It was at this date that the city changed its original name for that of Oreus, by which it was afterwards more generally known. At the end of the Peloponnesian war the descendants of the old inhabitants were restored by the Spartans, under whose dominion the city had fallen, and to whom it remained faithful till the battle of Leuctra, when it revolted from them. In the war between Philip and the Greeks, Oreus was frequently contested, and in B.C. 200 it was stormed by the Romans. Under them it gradually fell into decay. Some ruins of its fortifications are all that now remain to tell of its ancient greatness.

HISTOL'OGY (derived from the Greek words *histos*, a web or texture, and *logos*, a discourse) is the science which classifies and describes the structural or morphological elements which exist in the solids and fluids of organized bodies. It is identical or nearly so with general minute anatomy and with microscopic anatomy. Although its origin may be traced to the times of Malpighi (1628–94), who discovered the blood corpuscles, and of Leuwenhoek (1632–1723), who, with comparatively imperfect optical means, added much to our knowledge of the minute structure of the tissues, it never made any definite progress till the second decennium of the present century, when the compound microscope began to assume its present improved form. It was by means of this microscopico-chemical examination that the structure of the different horny tissues was first clearly exhibited, and it was thus proved that nails, cow's horn, and whalebone are similarly composed of aggregations of individual cells. Again, in the investigation of the nervous tissue, and of many other structures, chemistry and the microscope have been most usefully combined.

During the last quarter of a century, no department of medical science has made such rapid progress as histology. In Germany it has been successfully cultivated by Schwann, Henle, Valentin, Remak, Kölliker, Virchow, Leydig, Frey, and a host of others, scarcely less distinguished; in Holland, it has been actively prosecuted by Donders, Harting, and others; Lebert, Mandl, Robin, and others, have contributed to the French literature of the subject; while amongst our own countrymen, the names of Todd and Bowman, of Goodsir, Queckett, J. H. Bennett, Lockhart Clarke, and Beale, deserve honorable notice.

HISTOLOGY (*ante*). Although Malpighi and Leuwenhoek, Ruysch, Lieberkühn, and others, made several discoveries of minute parts with lenses, histology, as a science, did not commence until Bichat brought to bear upon the subject the powers of his generalizing mind, although his work was accomplished with but little aid from the microscope. His great work, entitled *Anatomie générale appliqué à la Physiologie et à la Médecine*, appeared at Paris in 1801. He was the first to classify tissues according to their structure. After Bichat came the epoch of histological research, which was the extension of the microscopic observations of Malpighi and Leuwenhoek in accordance with the general system of Bichat. The discovery of the method of combining lenses so as to render them achromatic gave a new impulse to the study, and a more perfect classification of the tissues of the body was the result, as it placed in the hands of Schwann an instrument which, although a few errors were unavoidable in so new and profound a science, enabled him to demonstrate the law that all tissues have their origin

in cells. This may be called the greatest discovery in histology, and therefore Schwann is often called the founder of the science of histogenesis, or the study of the origin of tissues, more recently pursued with such great success by Reichert, Koelliker, Remak, and others. Then the microscopic anatomy of diseased structures and their mode of development came to be investigated, and the science of pathological histology took its rise. Johannes Müller is regarded as the father of this branch of histology, as he indicated the general direction in which the investigation of diseased growths should be pursued. Afterwards Virchow, in the publication of his celebrated *Cellular Pathology*, added new luster to the science, which has recently been still further enriched by the labors of Bilroth, Rindfleisch, Recklinghausen, Cohnheim, and others. Now the science of histology enables the student to detect the elements of tissues in any organ, and also the first stages in the process of morbid growths by which the cell element gradually undergoes its transformation from a normal and healthy to an abnormal and sometimes malignant factor.

This brief historical notice needs only to be followed by a general view of those elementary tissues which it is the province of the science to investigate, and the study of whose functions forms so large a part of the science of physiology. In general terms, all tissues may be said to consist of cells, of one form or another. In cartilage the cells are globular or ellipsoidal, in the liver polygonal, in connective tissue long and spindle shaped. It was at first supposed that the elementary cell was composed of a little bag filled with fluid or solid matter, but now most histologists regard it as a small globular mass of living matter, or protoplasm, and this may have a nucleus, or exist without it. In regard to the power elementary cells may have of taking on different forms and becoming converted into different tissues, there is no certainty of knowledge. Whether the mature cells which form the various tissues have different natures in the first stages of their existence, or whether they are the results of transformations, cannot, perhaps, be determined; but it is more probable that each organ or tissue is made up of cells that are originally different; and it is by the development of this originally different organism, different not in form, perhaps, in any way that can be distinguished by the senses, but different in nature, that a primordial muscle cell will take to itself nutriment from the blood plasma, and become in time a fully developed muscle cell, and, in connection with the nerves distributed to the part, perform its ordained functions; that a hepatic cell, existing at first as a blastimic point in the evolving organ, passes in the same way through the various stages of its development, till finally it becomes the mature hepatic cell, and never becomes anything else physiologically: it cannot change to any other tissue, unless it passes under the power of malignant disease, and turns to a cancer or a sarcoma cell, or degenerates from loss of vital power. Human tissue elementary cells vary in size, from $\frac{1}{2000}$ to $\frac{1}{10000}$ of an inch in diameter, of a more or less ellipsoidal form, often nearly globular. There are two modes of cell growth, the endogenous, in which young cells form within the parent cell, and the exogenous, which takes place by a process of division; and this forms one of the grounds for believing that the cells of any tissue are always the cells of that particular tissue and no other. The most universal of all the elementary tissues of the body is connective tissue. As its name implies, it forms the connecting bond which holds together the special elements of the several organs, passing between and around them. The cells which form the special part of each organ can generally be distinguished with the aid of the microscope, varying widely in many instances, slightly in others. The organs, however, contain many tissues in common. They may in common have mucous membrane, but the cellular structure of this membrane differs in different organs. So far a special cellular element probably has the power of transformation, adapting itself to circumstances; but such transformation is different from that which would take place if an embryonic cartilage cell became an epithelial cell. Histology not only embraces the study of structural elements, but also elements of composition, or chemical elements, as well of the organs themselves as of their products. In this article no attempt can be made to do more than give an outline of what the science of histology is; the histological elements of many of the parts of the organs of the human body are given under their appropriate titles. Nothing has been said in this place of vegetable histology, although that science has existed longer, perhaps, than animal histology, and, being more simple, has been carried almost to perfection, while animal histology is scarcely out of its infancy; at least it is so immature that the results of its final development cannot be foretold.

HISTORY, a narrative of events and of the lives and acts of men, of families, of tribes, and of nations. History first took the form of tradition, and was handed down orally from generation to generation. Much of this tradition was obscure and mythical, assuming the form of religious belief. Written history is as old as the invention of letters, and among the earliest monuments were sculptured inscriptions and records of the acts of rulers, especially their victories. The oldest known historical writings are on the moncliths, temples, and pyramids of Egypt, the cuneiform inscriptions of Assyria, and those found in the ruins of ancient Greek and Phenician towns. The history of ancient Egypt, so far as recorded, extends from about 4,000 years to 700 B.C., about the time of the dissolution of the empire. Near the close of the 5th c. B.C., Herodotus, the

"father of history," was born, and his works are, so far as known, the earliest that can be classed under the name. It is usually supposed that he wrote, or meant to write, a universal history, but such was not the result; it was rather a partial history of the wars between Greece and the barbarians, with incidental geographical information attached.

Thucydides, the second great historian, was of a different order of mind. He approached the study of history from a philosophical standpoint, endeavoring to explain the actions which he recorded, while Polybius enlarged and improved upon the plan of Thucydides. The historians of Greece and Rome usually confined themselves to plain narrative, as Xenophon in his *Anabasis*, Cæsar in his *Commentaries*, and Livy in his more extended history. Tacitus alone showed distinct purpose in his work, lending his genius to the portrayal of tyranny in its blackest colors. Eusebius was the first great ecclesiastical historian. Procopius can be regarded only as a chronicler, neither scrupulous nor exact in his stories. Few historians appeared between the fall of the Roman empire and the middle ages, but the mental activity of the 12th c. and the invention of printing brought many into the field, and as facilities increased and the intercourse between nations became more frequent, we find a corresponding tendency towards historical writing. In regard to style, Macchiavelli and Guicciardini were long considered models of composition. Later historians, however, while imbibing the spirit of their writings, formed styles of their own, in accordance with the prevailing tendencies of their respective ages. De Thou in France, Mariana in Spain, Strada, the Dutch historian of the Low Countries, and sir Walter Raleigh, with his wonderful chronicles of fresh discovery, are all authorities to be recognized and consulted, while in more modern days appeared Hume and Robertson, and the greater Gibbon, the writer of the *Decline and Fall of the Roman Empire*, one of the most stupendous historical works ever produced.

The tendency of modern history is critical rather than merely narrative. Philology and archæology have very materially altered the reading of the histories that have come down to us, and in which the world has placed implicit faith. When the Bible is subjected to the ordeal of a new translation, we can hardly expect human history to escape. But if much that we have hitherto accepted as substantial is found to be mythical, it by no means follows that the main facts of history, as we have received them, are likely to be overthrown. Many of the histories written within the last half century are wonderful monuments of critical research. Authors are no longer content to accept the popular relation of occurrences without at least endeavoring to understand the motives which led to them and the effects produced by them. In these days the historian is no longer a mere reporter; he must be prepared to analyze character and to weigh events. He must seek his materials at the fountain-head, must compare the private with the public actions of the characters he portrays, and present to his readers a picture of men and women which shall be accurate in minute detail, and yet embrace the remoter consequences of their actions.

The origin of history may be attributed to that spirit of conservatism, largely inherent in human nature and readily developed in the progress of civilization, which incites to the preservation of a record of human life, its acts and occurrences. Our familiarity with the past is derived in the first instance from tradition, and later through the perpetuation of tradition and also of contemporary occurrence, by means of mural or monumental sculptures, inscribed tablets, or such other means as were feasible to those who desired to form the record. Naturally the first efforts in this direction were towards the preservation of a narrative of single events. These were sometimes incidents in natural phenomena of a startling nature—as floods, earthquakes, eclipses, etc.—and at others relations of momentous events in the lives of prominent individuals, usually potentates or wise men. Restricted by the means at hand, such a record was of course for a long time fragmentary and episodic. Bricks or tablets, the walls of buildings, and monumental piles served for the material, as symbolic or representative figures of birds, animals, and other suggestive objects answered for the manner. The first step in advance was taken when the discovery of the possible use of papyrus gave opportunity for the introduction of the elements of continuity and sequence into the preservation of intelligence, and actual *history* began. At first this took the form of annals, or chronicles, and it was not until after the middle ages that this form was abandoned for a more philosophical and systematic method of construction. And certainly the most charming and instructive works which undertake the purpose merely of bringing the future into contact and acquaintance with the past are those of the chroniclers of the middle ages. The names of Froissart, Monstrelet, Geoffrey of Monmouth, Matthew Paris, Holinshed, and the rest, should be remembered with reverence, and their writings studied with earnest appreciation. For these were the men who revived the historic element, after it had lain dormant during the stagnant period of the dark ages. To them, groping conscientiously, but naturally infused with the superstition and credulity of their time, we are indebted—not only for the histories which they wrote, after much severe and painstaking labor, but also for the encouragement which they afforded to future writers, and for the existence of the later and greater historical efforts which they made possible. And it would be doing injustice to a most important class of workers not to mention the writers of *memoirs*. It is to the authors of

the long series of works of this character, covering a large portion of the history of France, that we owe the preservation of a knowledge of events, and of the character of prominent personages, absolutely essential to the writing of a complete French history. Indeed those mousing investigators who spend their lives in searching out the truth of narration, in recording anecdotes and current manners and customs, and in generally contemplating the minor details of life with a view to the preservation of some accurate account of them, are of inestimable service to the historian. History, however, is of two kinds—narrative and philosophical. And it should be remembered that of these two species of history the latter is far the more important. "History," we are told, is "philosophy teaching by example." Merely narrative history is of no value whatever, of however much interest it may be in the way of satisfying a perfectly justifiable curiosity, except in so far as it teaches the lessons afforded by experience, and enables succeeding generations to profit by the lives of those which preceded them. It is, therefore, that species of history whose deductions from the events it records serve as a basis for the discovery and formulating of natural social laws, that possesses real value for humanity. Modern, like ancient, historians have generally become more justly famous for the vigor or polish of their style, the care they have displayed in the collection of their material, and the comprehensiveness of their design, than for philosophical analysis of the natural causes and bearing of the actions of men. Henry Thomas Buckle and Herbert Spencer are instances of the philosophical historian, as Sismondi, Thiers, Michelet, Hume and Smollett, and Bancroft are of the strictly narrative. Such writers as Macaulay, Prescott, Motley, and Froude have displayed the romantic side of history, and have discovered the possibilities of language in rendering its record glowing and fascinating, without departing from the limits of veracity. As history is but the combination and interweaving of human biography, it follows that works of a biographical character are among the most important implements of the historian. So also the division of history by classification—as of literature, ecclesiastical, history of art, bibliography, which is the history of books, etc.—aids greatly in modifying the mechanical labors of the historian, and enables him to give more time and thought to the philosophy of the events and lives he chronicles, and thus evolve from them their true merit, and usefulness to man.

HIT (the *Is* of Herodotus), a t. of Turkey in Asia, is situated on the right bank of the Euphrates, in the pashalic of Bagdad, and 110 m. w.n.w. of the city of that name. It is estimated to contain about 1500 houses, and is remarkable for the fountains of bitumen in the neighborhood. These fountains or pits are as abundantly productive at the present day as they were in the earliest ages. From them bitumen and naphtha are obtained in great quantity, and exported.

HITCH, a knot or noose by which one rope is fastened to another, or to some other object, as a hook, a cleat, a ring, etc. There are many sorts of hitches—as clove-hitch, midshipman's hitch, rolling-hitch, etc. Several of these knots will be described and figured under KNOT.

HITCHCOCK, a co. in s.w. Nebraska, on the Kansas border, intersected by Republican river; 720 sq.m.; pop. '80, 1012. The surface is chiefly prairie. Co. seat, Culbertson.

HITCHCOCK, EDWARD, D.D., LL.D., an eminent American geologist, b at Deerfield, Mass., U. S., May 24, 1793; was head of the academy in his native place, 1815–18; pastor of the Congregational church at Conway, 1821–25; professor of chemistry and natural history in Amherst college, 1825–45; principal and professor of natural theology and geology, 1845–54; and was principal till shortly before his death, Feb. 27, 1864. In 1824 he published *The Geology of the Connecticut Valley* a work which was well received, and opened the way to Hitchcock's advancement. He was appointed a state geologist, and as such made a thorough survey of the geology and mineralogical resources, including also the botany and zoology, of Massachusetts, in 1830; of part of New York in 1836, and of Vermont in 1857. He published the fruits of his researches regarding Massachusetts in 1831; and after issuing supplementary reports in 1833 and 1838, embodied the whole in his *Final Report on the Geology of Massachusetts* (2 vols. 1841), which is the standard work on this subject. In 1850 Hitchcock was appointed agricultural commissioner for his native state, and received instructions to visit and examine the chief agricultural schools of Europe, which he did; and subsequently published his *Report on the Agricultural Schools of Europe*, a valuable work. But he chiefly distinguished himself in the geological department of natural theology. His work on the connection between geology and religion—*The Religion of Geology and its connected Sciences* (1851)—has had a very wide circulation on both sides of the Atlantic. Hitchcock came forward prominently as an expositor of the fossil footprints in the Connecticut valley. The most important of his works, besides those mentioned above, are *Elementary Geology, with an Introductory Notice by Dr. Pye Smith* (1840), a work which has become extremely popular, having gone through 25 editions in America and 9 in England; *Fossil Footmarks in the United States* (1848); *Ichnology of New England* (1858); *Report on the Geology of Vermont* (1861).

HITCHCOCK, ETHAN ALLEN, b. Vt., 1798; a graduate of West Point, and instructor of infantry tactics. He served in the Mexican war, and afterwards com-

manded the military division of the Pacific. In the war of the rebellion he was maj.gen., of division and was one of the commissioners for interchange of prisoners. He was also one of the commissioners for the revising of the military codes. He has published *Remarks on the Alchemists; Swedenborg a Hermetic Philosopher; Christ the Spirit*, etc.

HITCHCOCK, Roswell Dwight, D.D., LL.D., b. Maine, 1817; graduated at Amherst, where he was afterwards a tutor. In 1845 he became pastor of a Congregationalist church; in 1852 professor of natural and revealed religion in Bowdoin college, and in 1855 professor of church history in the New York Union theological seminary. In 1871 he was chosen president of the Palestine exploration society. He was one of the editors of the *American Theological Review*, and has published a *Complete Analysis of the Bible*, and other works. In 1880, after the death of rev. Dr. William Adams, Dr. Hitchcock was chosen his successor as president of the seminary in which he is also a professor.

HITCHCOCK, Samuel A., 1784–1873; b. Mass.; the founder of the Hitchcock free high-school at Brimfield, and a liberal giver to Amherst and other colleges and to various charities. He gave in all more than $650,000.

HITCHIN, a t. of Hertfordshire, England, 14 m. n.w. from Hertford, on the Hiz, a branch of the Ivel and feeder of the Ouse, 420 ft. above the sea. It is a station on the Great Northern railway, and from it important lines of railway branch off to Bedford and other places on the n.w., and to Cambridge, etc., on the n.e. The town is irregularly laid out, but generally well built, with spacious streets. The principal trade is in corn, malt, and flour. There are several large breweries. Many females are employed in straw-plaiting. There are lavender-farms in the neighborhood. Hitchin was a place of some consequence in the days of king Alfred. Pop. '71, 7,630.

HITOPADE SA (literally "good advice," or "salutary instruction," from the Sanskrit *hita*, good, salutary, and *upadesa*, advice, instruction) is the name of the celebrated Sanskrit collection of fables, the contents of which have passed into almost all the civilized literatures of the earth. The collection itself, in the form in which we possess it, is founded on older works of a kindred nature, and is classed by the Hindus among their ethical works. See Sanskrit Literature.

HIT TEREN, a considerable island on the w. coast of Norway, lies about 47 m. w. of the town of Trondhjem, and is about 30 m. long by 10 m. broad. Pop. about 3,700, most of whom live by fishing.

HITTITES, the descendants of Heth, one of the children of Canaan, the grandson of Noah. I. *Notices of them in the Scriptures.* In the account of the settlement of nations after the flood the Canaanites are said to have been "spread abroad" and to have extended over the land of Palestine from Sidon on the n. to Gaza on the south. Their subsequent history shows that their spreading abroad was also far beyond those bounds. The children of Heth sold the field and cave of Machpelah to Abraham. Two of the daughters were wives of Esau. Among their towns one was named "the city of instruction" and "the city of the book"—titles implying an acquaintance with letters, and remarkable in connection with the inscriptions by which the course of their migrations is now traced. At the time of the conquest of Canaan by Joshua they are mentioned as among the possessors of the land, dwelling with the Jebusites and Amorites in the mountains, and extending their dominions to the river Euphrates. At a later day two of them are named among the personal attendants of David: Ahimelech, who went down with him into the camp of Saul, and Uriah, who was one of the thirty that constituted his guard. Solomon imposed tribute on them in common with other Canaanitish nations. In his day it is recorded that they were accustomed to buy horses and chariots in Egypt. That they continued in Palestine during and after the captivity appears from the statement in Ezra that some of the returned Jews married Hittite women. Though no particulars are recorded in Scripture concerning their religion, its idolatrous character is declared, since among Solomon's idolatrous wives Hittite women were included, and on the tribe, in common with the other inhabitants, are charged the abominations that defiled the land.—II. *Notices found in ancient inscriptions.* 1. On Egyptian monuments, in the time of Rameses II., 1306 B.C., Hittites are conspicuous among the eastern enemies of the Egyptians. This portion of them corresponds with those who are spoken of in Scripture as living beyond the bounds of Palestine. One of their cities, called Kadesh, "the holy," was near a lake, now named Kedes, fed by the Orontes s. of Emesa. The city is also described as being in the land of the Amorites, to which Carchemish, too, on the w. side of the Euphrates, belonged. Their country, consequently, was in the valley of the Orontes. Rameses II. boasted that he defeated this people with their allies, and commemorated the so-called victory on a papyrus roll, as well as by sculptured inscriptions, in which many tribes are mentioned as allied together who evidently did not dwell in Palestine. The Hittites are represented as having a regular army composed of disciplined infantry, cavalry, and 2,500 chariots, each drawn by two horses, and carrying a charioteer and two warriors. This army contained men of two tribes, one bearded and the other smooth-faced, and differing in dress and arms; yet both described under one name and as united in a common

cause. The fact, however, that in the 21st year of Rameses II. the great king of the Hittites went to Egypt and made a treaty of peace seems to favor the claim set up for the allies that they were not defeated by the Egyptian king but, on the contrary, forced him to sign a treaty, the terms of which were not unfavorable to them. A copy of a treaty, preserved in a hieroglyphic inscription, gives some information concerning the religion of the Hittites, describing their gods of war, of women, of mountains and rivers, with special mention of Ashtaroth in connection with a god of another name that corresponds with Baal. 2. In the Assyrian inscriptions there are references to a nation having a name that corresponds with the Hittites, and consisting of a confederacy ruled by 12 chiefs. Their territory was in the valley of the Orontes, and they were aided by people of the sea-coast, probably the Phenicians. Inscriptions, in what are recognized as Hittite characters, have been found on clay impressions of seals in Sennacherib's palace at Nineveh; in the walls of buildings at the ancient Hamath; in a rock-sculpture at Ibreez, in Lycaonia; at Carchemish; at Boghaz Keui and Eyuk, on the eastern side of the Halys; at Ghiaur Kalessi, in Phrygia; at Karabel, in Lydia; in the Taurus; and near Antioch. These various monuments indicate that the Hittite empire once extended from Carchemish, their capital, to the shores of the Ægean; and that two roads traversed it: one used by Crœsus in his march against Cyrus, and the other, along the s., the route of Xenophon and "the ten thousand." As the Assyrian empire rose that of the Hittites declined. Their provinces in Asia Minor were lost first, and afterwards their possessions in southern Syria. Kadesh on the Orontes, once their capital, and Hamath fell into Semitic hands; and, at last, Carchemish was taken by Sargon, 717 B.C. The double eagle is shown by the sculptures to have been a Hittite symbol. It was adopted by the Seljukian sultans in the 11th c., was brought to Europe by the crusaders, and used by the German emperor in 1345.

HITTORF, JACQUES IGNACE, 1793–1867; b. Germany; in 1810 a pupil of fine arts in Paris, and in 1818 architect for the government. He was long engaged in the construction of public edifices, such as the church of St. Vincent de Paul, and the embellishment of the Bois de Boulogne and the Champ Elysées. He wrote several works on architecture.

HITZIG, FERDINAND, a German biblical scholar, was b. June 23, 1807, at Hauingen, Baden, and educated at Heidelberg, Halle—where the influence of Gesenius determined him in favor of Old Testament studies—and at Göttingen. In 1833 he was called to Zürich as professor of theology, with a special view to the exegesis of the Old Testament; but his lectures embraced also the New Testament, and the languages of the east, especially the Semitic. In 1861 Hitzig returned as professor to Heidelberg. The first work which established his fame was his *Uebersetzung u. Auslegung d. Proph. Jesaias* (1833). Besides a translation of the Psalms, with a commentary (1835–36), he furnished for the *Exegetisches Handbuch zum A. T.* the commentaries on the twelve minor prophets (1838; 2d ed. 1851), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), and the Song of Solomon (1855), with a translation of all the prophetical books as a supplement (1854). He is also known by *Die Erfindung d. Alphabets* (1840), *Die Grabschrift d. Darius zu Naschki-Rustam* (1845), *Urgesch u. Mythologie d. Philistäer* (1846), etc., and by considerable contributions to periodicals. He died at Heidelberg in 1875.

HIVA-O'A, the principal island of the Marquesas group in the south Pacific ocean, is about 22 m. long by 10 m. broad. Its northern point is said to be in lat. 9° 34′ s., and in long. 139° 4′ west. Pop. stated at 6,500.

HI'VITES ("midlanders" according to Ewald, or "villagers" according to Gesenius), a Canaanitish people, who in the time of Jacob are found occupying the uplands of Ephraim, and later, the slopes of Hermon and the region westward towards Tyre.

HIZEN. A province in Kiushiu, Japan, famous for its porcelain manufactures, which are chiefly at or near Arita (see ARITA); pop. 1,074,461. It contains the large cities of Nagasaki and Saga.

H'LASSA. See LASSA.

HOADLEY, BENJAMIN, D.D., an eminent English prelate, was the son of the rev. Samuel Hoadley, master of the Norwich grammar school, and was b. at Westerham, in Kent, Nov. 14, 1676. In 1691 he entered Catherine Hall, university of Cambridge, where he became tutor after taking his degree of M.A. In 1701 he was chosen lecturer of St. Mildred in the Poultry, London, and from this time began to attract attention as a controversial writer. His *Reasonableness of Conformity to the Church of England*, appeared in 1703, which, like all his other performances, though agreeable to the sentiments of the educated laity of the church of England, was exactly the reverse to the great body of the clergy, both established and dissenting. Next year, he obtained the rectory of St. Peter-le-Poor, London, and was soon after engaged in a controversy with Dr. Atterbury (q.v.) on the extent of the obedience due to the civil power by ecclesiastics. This contest was conducted by Hoadley in such a way as to secure for him the applause of the house of commons, who in their address to the queen (Anne), referred to the important services he had rendered to the cause of civil and religious liberty. In 1710 Hoadley was presented to the rectory of Streatham, in Surrey; and in 1715, when the accession of George I. had secured the triumph of whig principles, was made bishop

of Bangor; but it is affirmed that he never visited this see, for fear of exciting a "party fury." He was, however, far from remaining idle. In 1717 he preached before the king a sermon on the text, "My kingdom is not of this world," in which he endeavored to show that Christ had not delegated his powers to any ecclesiastical authorities. He carried out this idea to great length, and maintained that it was the best and safest ground to take up in attempting to refute both Roman Catholics and dissenters. Hence originated the famous Bangorian controversy, regarding which Hallam says, that it was "managed, perhaps on both sides, with all the chicanery of polemical writers, and disgusting both from its tediousness, and from the manifest unwillingness of the disputants to speak ingenuously what they meant." Hoadley's principal opponent was William Law. Hallam speaks of having read 40 or 50 pamphlets on the question. In 1721 Hoadley was transferred to the see of Hereford; in 1723 to that of Salisbury; and in 1734 to that of Winchester. In 1735 he published a *Plain Account of the Nature and End of the Lord's Supper;* and in 1754–55 two volumes of sermons, which were highly esteemed. He died April 17, 1761, in the 85th year of his age.

HOADLEY, Benjamin (*ante*), 1676–1761; b. England; bishop of Bangor in 1715; of Hereford in 1721; of Salisbury in 1723; and of Winchester in 1734. He attracted much attention at first by his controversy with bishop Atterbury in 1709, when he was rector of Streatham. The house of commons were so pleased with the manner in which he defended himself against the tory Atterbury that Hoadley's name was mentioned in the address to the queen as a champion of liberty, both civil and religious. He developed his principles in his tract on the *Measure of Obedience to the Civil Magistrate.* But in 1714 queen Anne was succeeded by George I., the tories ceased to be in favor at court. In 1715 Hoadley was raised to the bishopric of Bangor; and in 1717 the celebrated *Bangorian controversy* arose. It began by Hoadley's publication of his views on the text, "My kingdom is not of this world;" in regard to which he maintained that Christ had left behind him no such authority as that claimed by churches, and that this was the best way of answering the arrogant pretensions of the church of Rome. These views gave great offense both to high church and dissenters. He was attacked from all quarters. William Law is considered his ablest antagonist. The controversy raged for three years. From his *Discourses on the Terms of Acceptance,* it is obvious that he rejects the five points of Calvinism. He wrote an account of the *Nature and End of the Sacrament,* and a *Letter to Clement Chevalier.*

HOADLEY, John, 1711–76: son of Benjamin; educated at Cambridge, and was chaplain to the prince of Wales, prebendary of Westchester, and rector of St. Mary's. He wrote *Love's Revenge,* a pastoral; *Jephtha,* an oratorio; *Phœbe, and the Force of Truth,* and edited his father's writings.

HOANG-HAI. See Whang-hai, *ante.*

HOANG-HO. See Whang-ho, *ante.*

HOAR, Ebenezer Rockwood, ll.d., b. Mass. 1816; graduated at Harvard, and in 1840 was admitted to the practice of law. He was appointed a judge, but resigned in 1855. Four years later he was made a supreme court judge, and held the seat until 1869, when he became U.S. attorney general, in which office he made many important improvements, raising it to the rank of a district department of the government, known as the department of justice. In 1872 he was elected to congress.

HOAR, George Frisbie, b. Mass. 1816; a son of Samuel; graduated at Harvard in 1835; in 1849 began the practice of law at Worcester. In 1868 he was chosen a member of congress, and was re-elected three successive times. In 1876 he was chosen a senator of the United States. In 1880 he was president of the republican national convention at Chicago for the nomination of president and vice president of the United States.

HOAR, Samuel, ll.d., 1778–1856; b. Mass.; graduate of Harvard, admitted to the bar in 1805, and soon became a conspicuous lawyer. He was in the constitutional convention of 1820; a state senator in 1825; afterwards a state councilor, and in 1835 a member of congress. In 1844 he was sent by the Massachusetts legislature to South Carolina, to dispute before the courts the constitutionality of certain laws of that state authorizing the imprisonment of free negroes coming into the state. He was, however, not allowed to plead, but was forcibly expelled from Charleston by the public authorities, the South Carolina legislature by special act authorizing the expulsion.

HOARE, Sir Richard Colt, 1758–1838; b. England; inherited a large fortune, and turned his attention exclusively to literature and art. He traveled over Europe, Ireland, and Wales, collecting a great number of sketches, and publishing accounts of portions of his tours. His principal work was an elaborate history of Wiltshire, profusely illustrated, which was not completed at his death.

HOARE, William, 1707–92; b. England; a painter of eminence, one of the earliest members of the royal academy. He produced some altar pieces, and portraits of William Pitt, Grenville, and other noted statesmen.

HOAR-FROST. See Dew.

HOARHOUND, *marrubium,* a genus of plants of the natural order *labiatæ,* having a tubular 10-ribbed calyx, with 5 or 10 spiny equal teeth, 4 stamens included in the

corolla, the upper lip of the corolla erect, the lower lip 3-cleft. The species are mostly perennial, herbaceous plants, natives of the s. of Europe and the East. One species, the COMMON or WHITE HOARHOUND (*marrubium vulgare*), is a native of Britain, and is found generally throughout Europe, except in the more northern regions, growing in waste places, waysides, etc. It is about 1—1½ ft. high, bushy, with roundish, ovate, crenate, wrinkled leaves, and almost globose whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxative, and is much used in coughs, being a popular remedy, and a very safe and efficacious one. It was formerly also employed in affections of the womb and of the liver. It is administered in the form of an infusion, or made into a syrup with sugar, and sometimes the syrup is candied. The name hoarhound belongs also to another plant, a native of Britain, *ballota nigra*, sometimes called black hoarhound, a fetid plant, also of the order *labiatæ*, and of a genus very closely allied to *marrubium*. It closely resembles the white hoarhound in taste, and possesses similar medicinal properties. A third British plant, *lycopus Europæus*, a diandrous plant of the same natural order, is sometimes called WATER HOARHOUND. It is also known as gypsy-wort.

HOARSENESS. See THROAT, DISEASES OF.

HOA'ZIN, or **TOURACO**, *opisthocomus cristatus*, a bird nearly as large as a peacock, which it somewhat resembles it its gait and manners; a native of Guiana and Brazil; generally referred by naturalists to the family *cracidæ* (with curassows and guans) and the gallinaceous order; but by some regarded as of the order *insessores*, and as allied to the plantain-eaters. Its anatomy is remarkable: it has an enormous crop, whilst the gizzard is very small. It is gregarious, and frequents marshy situations.

HOBART, JOHN HENRY, S.T.D., 1775–1830; b. Philadelphia; graduated at Princeton, where he became a tutor, and a student of theology. He was ordained a deacon of the Protestant Episcopal church in 1798, and was subsequently a pastor in New Jersey and on Long Island. In 1812 he was assistant rector of Trinity church, New York, and in 1816 was chosen rector of the church and bishop of the diocese. He was one of the founders of the general theological seminary in which he was professor of pastoral theology. In 1823 he traveled in Europe studying the social and moral condition of the people. In London he published two volumes of sermons directed against the observance of forms to the neglect of essentials. He was a zealous supporter of episcopacy, and opposed the union of denominations and such organizations as Bible and tract societies. Among his works are, *Apology for Apostolic Order*, *The State of the Departed*, and various devotional manuals.

HOBART PASHÁ, admiral of the Turkish fleet, third son of the earl of Buckingham, his real name being Augustus Charles Hobart, was b. April 1, 1822. Entering the British navy in 1836, he distinguished himself in the Crimean war and rose to the rank of captain. Being of an adventurous turn, he took command of a blockade runner during the war of the southern rebellion. In 1867 he offered his services to the sultan, who gave him command of the fleet operating against Crete. He took this step without asking leave of the British admiralty, and in consequence of the remonstrances of the Greek government his name was stricken from the British navy list; but afterwards, upon his own plea that he was serving an ally of the British government, and that he had contributed to maintain the peace of Europe, he was restored to his former rank and placed upon the retired list, with the opportunity of rising by seniority to the rank of a retired admiral.

HO'BART TOWN, the capital of Tasmania, or Van Diemen's Land, stands on the Derwent, near its entrance into Storm bay, on the s. coast of the island. It is in lat. 42° 53′ s., and long. 147° 21′ east. The mean temperature for the year is 52.3°, being 42.1° in winter, and 63.1° in summer. Pop. over 20,000. Besides the government official buildings, Hobart Town has a college and several public schools; and its naturally excellent harbor and noble quay accommodate ships of the largest size. It has considerable manufactures, and railways communication with Launceston.

HOBBEMA, or HOBBIMA, MINDERHOUT, or MINARD, a landscape painter of the Flemish school, b. Antwerp about the beginning of the 17th century. His personal history is a total blank. The only fact in it that can be relied on as even approximately true is that he died at a very advanced age in 1699. His landscapes, which are now rather rare, are extremely simply in their structure; but his management of perspective, and his conduct of chiar-oscuro, enable him to express vast distances in a few square feet of canvas, and to imprint a distinctive and marked character upon the homeliest scenes. His execution is wonderfully careful, yet so well harmonized, and so light and graceful, that each separate piece is in itself a perfect gem of art. His style bears so strong a resemblance to that of Ruysdael that many of his pieces pass under that artist's name.

HOBBES, THOMAS, was b. at Malmesbury, on April 5, 1588, and was the son of a clergyman of that town. At the age of 14 he went to Oxford, and was put through the usual course of Aristotelian logic and physics. His instructions in the syllogism

he afterwards held in very small estimation. At the age of 20, having taken his degree and quitted Oxford, he was recommended to lord Hardwicke, afterwards earl of Devonshire, as tutor to his eldest son, this being the commencement of an intimate connection with that great family which lasted through his long life.

In 1610 he went abroad with his pupil, and made the tour of France and Italy. After his return he still continued to live with the Devonshire family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Raleigh, Ben Jonson, and the other distinguished men of the time. Meantime he was occupied with his classical, political, and philosophical studies, and prepared for publication his first work, a translation of Thucydides, which came out in 1628, he having now attained the mature age of 40.

The earl of Devonshire having died in 1626, and the young earl, Hobbes's pupil, in 1628, he was plunged in great grief, and took the opportunity afforded him of going abroad with the son of sir Gervase Clifton, and remained some time in France. In 1631, however, his connection with the Devonshire family was resumed. By the desire of the dowager-countess, he undertook the education of the young earl, the son of the former pupil, then only 13. In 1634 he went to Paris, and on this occasion was much in the society of father Mersenne. He returned to England in 1637. He seems then to have applied himself to the composition of his first original work, entitled *Elementa Philosophica de Cive*, which was printed in Paris in 1642. This is the first exposition that he gave of his moral and political philosophy. His advocacy of pure and unrestrained monarchy as the best possible form of government, with an absolute submission on the part of the subjects both in law and in morality, and religion, to the will of the monarch, has probably given more general offense than any political theory ever propounded. It has been made the subject not merely of incessant attack, but of gross misrepresentation. He published soon after two small treatises, entitled *Human Nature*, and *De Corpore Politico*. The first contains his views as to the constitution of the mind, and entitles him to be considered as the father of modern systematic psychology. Although the work is valuable in itself, he still considers it as a prelude to the other treatise, *De Corpore Politico*, or on the nature of society, which is here handled for the second time by him, and in much the same strain. He goes over the whole ground a third time in the *Leviathan*, published in 1651 the fullest and perhaps the best known exposition of his views on mind, politics, morals, and religion. Here he contends as before in favor of pure monarchy, which he represents to have grown out of a primitive contract between the sovereign and the people, moved by the desire to escape from all the evils of a state of nature, which is a state of war. He is far from justifying tyranny; on the contrary, he enjoins upon the monarch a government according to just laws, and considers that this is more likely to be obtained by the government of a single person, whose selfish aims must be sooner satiated than if the supreme power were distributed in a number of hands.

After the meeting of the Long parliament in 1640, he had returned to Paris, from his dread of the civil troubles. In 1647 he was appointed mathematical tutor to the prince of Wales, afterwards Charles II., and stood high in the esteem of that prince; but the obnoxious character of his writings, especially after the publication of the *Leviathan*, so offended the royalist clergy, in common with all other sects, that Charles was induced to part with him; and he himself, being constitutionally timid, took the alarm for his personal safety, and abruptly fled from Paris to England. In England, he found himself safe, the Protestant government according him the most ample toleration. Very different was his position after the "glorious" restoration of his own friends; for although Charles granted him a pension of £100 a year, the dislike to his views was so general that they were condemned by parliament in 1666, and he was even in danger of still severer measures. His connection with the earl of Devonshire, with whom he lived in the latter part of his life, was no doubt a powerful protection to him. His old age was fruitful in additions to his writings, and was marked by some sharp controversies. His last works were a translation of Homer, and a history of the civil wars. He died on Sept. 4, 1679, in his 92d year.

HOBBY, *falco subbuteo*, a small species of falcon, a native of all or most parts of Europe and of many parts of Asia and Africa. It is in its utmost length, about 12 or 14 inches. It is grayish-black or bluish-gray on the upper parts, each feather edged with yellowish-white, and the whole form is very elegant. The hobby is occasionally seen in Britain, but is rare—rarer now than it seems to have been in former times It was often employed in falconry, and trained to fly at pigeons, and even at partridges.

HOBHOUSE, JOHN CAM. See BROUGHTON, lord.

HO'BOKEN, a city in New Jersey, U.S., on the w. bank of the Hudson river, opposite New York, with which it is connected by several steam-ferries. Its beautiful pleasure-grounds, the Elysian fields, formerly much resorted to by New-Yorkers, are now mostly sold for business purposes. There are heights which afford a fine view of the cities of New York and Brooklyn harbor, and fortifications.

HOBOKEN (*ante*), a city in Hudson co., N. J., on the Hudson river, opposite New York; pop. '70, 24,766; in '80, 30,999. It is substantially a section of Jersey city, and was for many years a rural district of great beauty, and one of the chief pleasure resorts

for citizens of the metropolis. In recent years it has been thickly peopled with Germans, and has quite lost its rural character. It is the landing place of several lines of European steamers, the terminus of a number of railroads, and has a great number of manufactories, including foundries, breweries, machine shops, iron works, etc. Among its institutions are St. Mary's hospital, the Martha institute, and the Stevens institute of technology. The latter was founded by E. A. Stevens, who presented a building site and a fund of $650,000. It has also an academy, a seminary for girls, and many excellent schools. The city (chartered in 1855) is lighted with gas, and furnished with water from the Passaic river. It was settled by the Dutch soon after their establishment in New Amsterdam (now New York).

HOCHE, LAZARE, one of the most eminent generals of the French republic, was b. June 25, 1768, at Montreuil, a faubourg of Versailles. In 1785 he entered the army, rapidly obtained promotion, and was raised, in 1793, to the command of the army of the Moselle. Here he was opposed to the duke of Brunswick, the commander of the Prussian army, and was by him repeatedly defeated. He was more successful against the Austrians, whom he drove out of Alsace. His next important service was putting an end to the civil war in La Vendée, which he accomplished in a prudent and patriotic manner. After having been sent, in the winter of 1796, as commander of the troops in the unfortunate expedition to Ireland, he was on his return appointed to the command of the army of the Sambre and Meuse. On April 18, 1797, he crossed the Rhine at Neuwied, and had defeated the Austrians in several battles, when his career was stopped by the armistice concluded between the archduke Charles and Bonaparte at Leoben. After the 18th Fructidor, he was suddenly taken ill in the camp at Wetzlar, and died Sept. 18, 1797.

HOCHELAGA, a co. in the province of Quebec, Canada, occupying 76 sq.m.; on the e. part of the island of Montreal; pop. 25,640. The capital is Longue Pointe.

HOCH'HEIM, a small t. of Prussia, in Hesse-Nassau, on the slopes of the right bank of the Main, 3 m. from Mainz. Several varieties of excellent wine produced here are known as *hochheimer;* hence the English name *hock,* now given indiscriminately to all wines from the Rhine regions.

HOCH'KIRCH, or HOCHKIRCHEN, a village in the district of Bautzen, in Saxony, was the scene of a battle between the Austrians and Prussians (Oct. 14, 1758) during the seven years' war. Frederick II. of Prussia, with an army 30,000 strong, having taken up an almost untenable position at Hochkirch, was attacked, under cover of a thick fog, by marshal Daun, with 50,000 Austrians, and compelled to retire to the heights of Dresa. Here he was again attacked by the duke of Aremberg, and after a conflict of five hours' duration, again retired. He lost 9,000 men killed and wounded, and 101 cannons. He himself and almost all his generals were wounded. The Austrians lost 8,000 men. On May 21, 1813, a battle took place here between the French and allies. See BAUTZEN,

HÖCHST, a t. in Hesse-Nassau on the Frankfort and Mentz railroad, 5 m. w. of Frankfort; pop. 4,055. The people are engaged in various manufactures. In June, 1622, Tilly won a battle here over duke Christian of Brunswick, and in 1795 the French were here defeated by the Austrians.

HOCH'STADT. See BLENHEIM.

HOCKING, a co. in s. Ohio on the Hocking river, intersected by the Columbus and Hocking valley railroad and a canal; 380 sq.m.; pop. '70, 17,925. It has a hilly surface and is partially covered with forests. There are iron and coal mines, but the chief productions are corn, wheat, oats, wool, and pork. Co. seat, Logan.

HOCKING, or HOCKHOCKING, a river in Ohio, near the middle of the state, running through a picturesque region and emptying into the Ohio. Boat navigation is possible for about 70 m., but beyond that distance are many falls and dams. The Hocking canal passes along one of the shores.

HODEIDA, or EL HUDAIDAH, a port in Arabia on the Red sea, 100 m. above Mocha, much visited by pilgrim ships from the east. The harbor is shallow, but there is considerable trade in coffee and India goods. It is the seat of the Turkish governor of Yemen.

HODGE, ARCHIBALD ALEXANDER, D.D., b. N. J., 1823; graduated and was a tutor at Princeton; in 1847 a missionary in India under the charge of the American board. He returned in 1850 and settled as pastor in Maryland, Virginia, and Pennsylvania. In 1846 he became professor of theology in the western theological seminary at Allegheny city, and in 1877 at Princeton. He is the author of *Outlines of Theology, The Atonement* and *Presbyterian Doctrine Briefly Told,* and other works.

HODGE, CHARLES, D.D., LL.D., an American theologian, was b. in Philadelphia, Dec. 28, 1797. He graduated at Princeton college in 1815, and in 1822 became a professor in the Princeton theological seminary, where he remained till the close of his life. He was founder and long the editor of the *Princeton Review;* and besides numerous essays, etc., he was the author of Commentaries on Romans, Corinthians, and Ephesians, on a work on the history of the Presbyterian church in America (1840), of a criti-

cism of Darwinism (1874), and of the well-known *Systematic Theology* (3 vols. 1872), now a standard work of the Calvinistic churches. He died June 19, 1878.—His son ARCHIBALD ALEXANDER is also favorably known as a theologian.

HODGEMAN, a new co. in w. Kansas on the Pawnee fork, a branch of the Arkansas. Organized after the census of 1870.

HODGES, WILLIAM, 1744–97, an artist who was with capt. Cook on his second voyage to the Pacific, and made the illustrations for Cook's narrative. He was afterwards in India under the patronage of Warren Hastings.

HODGKINSON, EATON, professor of the mechanics of engineering in University college, London, and the chief authority on the application of iron to architecture and engineering, was b. at Anderton, near Northwich, Cheshire, Feb. 26, 1789. At the age of 21, he settled in Manchester. At this time the principal authority on iron beams was Tredgold (q.v.), but his theories were overturned by Hodgkinson. Hodgkinson next made a series of 227 experiments on the strength of pillars, generally in conjunction with sir William Fairbairn (q.v.). For his important experiments and calculations, and general co-operation in the construction of the Britannia bridge, he received a first-class medal at Paris in 1855. His investigations are in general scattered through the *Transactions* of the British association, and the memoirs of the Manchester society. He also edited *Tredgold on the Strength of Cast Iron*, adding his own theories (1842–46). Hodgkinson died in June, 1861, near Manchester. See STRENGTH OF MATERIALS, and TUBULAR BRIDGES.

HODGSON, JOHN EVAN, b. London, 1831; educated at Rugby, and in 1853 became a student of art at the royal academy. His first picture was exhibited in 1856, since which time he has been a regular exhibitor. He first painted domestic and contemporaneous subjects, but afterwards excelled in historical pictures from 1861 till 1869, when his visit to n. Africa interested him in subjects of Moorish life, to which he has since chiefly confined himself. His principal pictures are—"Arrest of a Poacher," "Canvassing for a Vote," "Sir Thomas More's Daughter in Holbein's Studio," "A Rehearsal of Music in a Farm-house," "Return of Sir Francis Drake from Cadiz," "First Sight of the Armada," "Queen Elizabeth at Purfleet," "Taking Home the Bride," "Jewess Accused of Witchcraft," "Chinese Ladies and European Curiosities," "Roman Trireme at Sea," "Arab Story-Teller," "Arab Prisoners," "The Pasha's Black Guards," "The Outpost," "An Arab Patriarch," "Army Reorganization in Morocco," "The Snake Charmer," "A Fair Customer," "Jack Ashore," "A Tunisian Bird-seller," "A Needy Knife-grinder," "Returning the Salute," "Odd Fish," "A Barber Shop in Tunis," "The Talisman," "The Temple of Diana at Zaghouan," "Better have a New Pair," "Following the Plough," "Commercial Activity in the East," "Pampered Menials," "Relatives in Bond," "An Eastern Question," "Lost," and "The Pasha."

HODOMETER is an instrument for measuring the distance traveled over by any conveyance, and consists of an arrangement of toothed wheels, like clock-work, fixed on one side of a machine, and connected with the axle, from which motion is communicated to it. An index and dial show the exact distance the vehicle has traveled.

HOE, an implement of gardening and of agriculture used for stirring the soil, drawing up earth to plants, thinning plants in drills, clearing the ground of weeds, etc. There are many forms of this implement, all of which may be referred to two classes—*draw-hoes* and *thrust-hoes*, the former having the blade almost at right angles to the handle; the latter almost in the same plane with it. The thrust-hoe, or *Dutch hoe*, is chiefly used for killing weeds, and for stirring ground to a very slight depth. The draw-hoe, although much used as an implement of gardening, is scarcely used in Britain as an agricultural implement, except for the thinning (*singling*) of turnips, in which it is always employed. But in some countries it is very extensively used in place of the spade. In some parts of the West Indies almost all the tillage of the ground is done by the hoe. It is more adapted than the spade to the use of laborers whose feet are not provided with shoes. Hoes intended for tilling the ground, instead of the plow and spade, are much larger and heavier than those used in British gardening, and are raised much higher, and brought down to the ground with greater force, somewhat like the pickaxe. Hoes for stirring very stiff soils are sometimes made with prongs instead of a blade.

In the improved agriculture of the present day, implements called *horse-hoes* are extensively used. They are intended for purposes corresponding with those of the thrust-hoe, and may be generally described as consisting of thrust-hoe blades, variously modified, and attached to a frame in order to be drawn by a horse. Various contrivances are employed to accommodate the blades to inequalities of surface, etc. Horse-hoes can only be employed for crops sown in drills: and the drills must be perfectly parallel, if more than one interval is to be cleaned and stirred at once. With the sowing machines now in use, however, this is secured. In turnip-husbandry, a horse-hoe with several blades is often used to clear away the weeds from one interval.

HOE, RICHARD MARCH, b. New York, 1812; the son of an English inventor. He is known all over the world for his many valuable improvements in printing presses, of which he is the leading manufacturer. He went to England in 1837 to patent an improvement in the manufacture of saws, and his visit enabled him to perfect improve-

ments in printing machinery, which were adopted largely in England as well as in America. In 1846 he invented the "lightning press," named from the wonderful rapidity of its work.

HOEI-SHIN, or HUI-SHÊN, a Buddhist monk of China supposed to have lived about the close of the 5th C. A.D., and to have traveled in foreign lands, which might be western North and South America. He said that iron was not to be found in these countries; that gold was not esteemed, and was of no value in commerce. He also asserts that he found Buddhist institutions already established.

HOE'S MACHINE. See PRINTING.

HOEVEN, JAN VAN DER, a distinguished Dutch naturalist. He was b. in 1801 at Rotterdam, and after studying medicine at Leyden, established himself as a physician in his native town, where he remained till 1835, when he was elected to the professorship of zoology in the university of Leyden, an office which he held till his death in 1868. His most important work is his *Handboek der Dierkunde* (Leyden, 1827–33), of which a second edition, entirely recast, appeared in 1846; a German translation was published in 1848; and an English translation, by prof. Clark of Cambridge, under the title *Handbook of Zoology*, was issued, with important additions, both by the author and the editor, in 1856–58. The fact that most of his works are memoirs, and written in Dutch, is a great check to their general perusal by English and French naturalists.

JAN must not be confounded with his brother, CORNELIUS PRUYS VAN DER HOEVEN, professor of medicine in the university of Leyden, and the author of several important works, amongst which may be especially mentioned *De Historia Medicinæ* (Leyden, 1842) and *De Historia Morborum* (Leyden, 1846).

HOF, a manufacturing t. of the kingdom of Bavaria, in upper Franconia, is situated in a fruitful district on the Saale, 32 m. n.e. of Bayreuth. Besides extensive manufactures of leather, and linen and woolen fabrics, an important transit trade, arising from its position on the frontiers of Bavaria, and on the railway connecting that country with Saxony, is here carried on. Iron and coal mines are worked in the vicinity. Pop. '75, 18,267.

HOFER, ANDREAS, the patriotic leader of the Tyrolese, was b. at St. Leonard, in the valley of Passeyr, Nov. 22, 1767. In 1796 he led a body of Tyrolese against the French on the lake of Garda; in 1808 secret deputies, among whom was Hofer, arrived at Vienna, to represent to the archduke John the sufferings of the people, and their wish to be reunited to Austria. By the desire of the archduke, baron von Hormayr sketched for them a plan of an insurrection, which met with such success that, in three days, from the 11th to the 13th of April, 1809, nearly the whole country was liberated. Napoleon, however, was victorious in Austria, and at once marched three armies to the Tyrol, to subdue the rebellious peasantry, who had been abandoned by the Austrians, in accordance with the armistice of Znaim (July 12, 1809). At first, Hofer concealed himself in a cave in the valley of Passeyr; but when Spechbacher, Joachim Haspinger, a Capuchin, and Peter Mayer, at the head of the armed population, renewed the defense of the Tyrol, and repeatedly defeated the enemy, Hofer issued from his retreat, and took the leadership of the Tyrolese. At the battle fought on Aug. 12 on the Iselberg, Lefèbvre was driven from the Tyrol. Hofer continued to conduct the civil and military administration till the peace of Vienna (Oct. 14). The French and Bavarians poured, for the third or fourth time, into the country, and after a brief struggle Hofer was obliged to take refuge in concealment. After a lapse of two months, he was betrayed into the hands of the French by a priest named Donay, conveyed to Mantua, tried, and condemned to be shot. The sentence was carried into execution on Feb. 20, 1810. His family were indemnified for the loss of their property by the emperor of Austria in 1819, and his son ennobled. A statue of Hofer, executed by Schaller, was erected in 1834 in the church of the Franciscans, at Innsbrück, near the tomb of the emperor Maximilian I.

HOFFMAN, CHARLES FENNO, b. New York, 1806; educated at Columbia college, at the age of 21 admitted to the bar, and about the same time became a writer for newspapers. When the *Knickerbocker Magazine* was started he was for a few months the editor. In 1835 he published *A Winter in the West*, and two years later *Wild Scenes in the Forest and the Prairie*. In 1840 he published *Greyslaer*, a novel. But his fame rests chiefly upon his poems. Thirty years ago he became afflicted with mental disease, and has since lived in an asylum.

HOFFMAN, DAVID, LL.D, 1784–1854; b. Md.; in 1817 professor of law in the university of Maryland. After 1836 he traveled for a time in Europe, and sent a number of articles relating to the United States to a London paper. He published *A Course of Legal Study; Legal Outlines; Viator; Chronicles selected from the originals of Cartaphilus, the Wandering Jew;* and *Miscellaneous Essays.*

HOFFMAN, MURRAY, 1791–1878; b. New York; graduated at Columbia college, and became one of the foremost of lawyers. In 1839 he was assistant chancellor, and in 1853 judge of the supreme court. His legal publications are numerous and valuable. Among them are *Office and Duties of Master in Chancery; Vice Chancery Reports;* and three books on ecclesiastical law and custom.

HOFFMAN, OGDEN, 1799–1856; b. New York; graduated at Columbia college; served in the second war with England as a midshipman; was admitted to the bar, and made a great reputation as a lawyer in New York. In 1837, and again in 1848, he was elected a member of congress, and in 1854 was attorney-general of New York state.

HOFFMAN, WILLIAM, b. New York, 1807; a graduate of West Point; served in the Black Hawk and Florida Indian wars, and in the war with Mexico. In the war with the rebellion he was commissary gen. of provisions. In 1870 he was retired from service with the rank of col. and brevet rank of maj.gen.

HOFFMANN, AUG. HEINRICH, commonly called HOFFMANN VON FALLERSLEBEN, a distinguished German poet and philologist, was born April 2, 1798, at Fallersleben, in the district of Luneburg, He went in 1816 to the university of Göttingen, which in 1819 he left for Bonn. He soon gave up theology, which his father had destined him to, and occupied himself exclusively with philological and literary studies, which, from his first acquaintance with the brothers Grimm (1818), turned more and more to his native language and literature. After traveling through the Rhine countries and Holland in search of popular poetry, and living for some time in Berlin, he was made keeper of the university library of Breslau in 1823, extraordinary professor of the university there in 1830, and ordinary professor of the German language and literature in 1835. The publication of his *Unpolitische Lieder* (Unpolitical Lays) led to his being deprived of his office, Dec. 20, 1842. For some years afterwards Hoffman, thrown entirely upon literary work for his support, led a wandering life through the whole of Germany, Switzerland, and Italy, the subject of laudation on the one hand, or of vituperation on the other, and at times kept under the surveillance of the police. In 1845 he was naturalized in Mecklenburg. Restored to his rights in Prussia, 1848, he drew from that time his statutory salary as a pension, He married in 1849, settling on the Rhine, and in 1854 he went to Weimar. In 1860 he became librarian to the duke of Ratibor, at the castle of Korvei, on the Weser, where he died in 1874. His principal philological and antiquarian works are: *Horæ Belgicæ* (1830–37), *Reineke Vos* (1834), *Geschichte des Deutschen Kirchenlieds* (1832), collections of ancient German political (1843) and social (1844) songs, *Spenden zur Deutschen Literaturgeschichte* (1845), and *Die Deutsche Philologie* (1836). Hoffmann's own poetry has a close alliance to popular song, and hits the tone of genuine simplicity, tenderness and pathos to a degree that scarcely any other poet of recent times has succeeded in doing. He also produced many admirable tunes for his songs. The *Gedichte* appeared in 1834 (8th ed. 1874), and he published numerous collections of songs, as *Allemannische Lieder, Soldatenlieder, Kinderlieder*, etc. He wrote an autobiography in 6 vols. (*Mein Leben*, 1862–70).—See Wagner's *H. von Fallersleben* (1869), and Gottschall, *Porträts* (1876).

HOFFMANN, ERNEST THEOD. AMADEUS, properly WILHELM, one of the most original German story-tellers, was born Jan. 24, 1776, at Königsberg in Prussia. He studied law there, and then found employment in the government offices at Grossglogau and in Berlin. In 1800 he became assessor to the government of Posen; but in consequence of some able caricatures of his, which gen. Zastrow and others in high positions applied to themselves, he was removed in 1802, as councilor to Plock, and in 1803, in the same capacity to Warsaw, where the entrance of the French ended his career. Without prospects of fortune, he made use of his knowledge of music as a means of livelihood, and, though sometimes reduced to great straits, managed to support himself by giving music lessons, and by contributing to the *Musical Gazette* of Leipsic. In 1813 he went to Dresden as music director to a company of players alternating between Dresden and Leipsic, and continued to conduct the orchestra of the company till 1815. In 1816 he was again appointed by Prussia to be councilor in the royal supreme court of judicature at Berlin, where, before long, he was seized with a disease in his back, the consequence of his irregular life, and after much suffering, died July 24, 1822. From his youth he had devoted all his leisure hours to the study of music. The *Phantasiestücke in Callot's Manier, Elixire des Teufels, Nachtstücke, Die Serapionsbrüder Lebensansichten des Kater Murr, Der Doppelgänger*, and a few shorter stories, all appeared between 1814 and 1824. Hoffmann was a man of thorough originality, and yet an excellent man of business, and lawyer. He had a keen understanding, but was full of fantastic ideas, and a believer in demons. His character was made up of incongruities; and between like contradictory extremes his novels range. His fame rests mainly on his novelettes, which are masterpieces in miniature, such as *Das Majorat, Fräulein Scudéry Doge u. Dogaresse.* Hoffmann's talents were wonderfully various; he not only distinguished himself as a poet and composer, but as a caricaturist. He handled language in a masterly way, although not free from mannerism. A collection of his choice works appeared in 1828 (10 vols.), and one of his collected works in 1857 (12 vols.). See Hitzig, *Aus Hoffmann's Leben und Nachlass* (1823). In foreign countries, particularly in France, Hoffmann has been repeatedly translated and imitated.

HOFFMANN, FRIEDRICH, one of the most celebrated physicians of the last century, was born at Halle in 1660, and died in that city in 1742. At the age of 15 he lost his parents, who died from typhus fever, and very shortly afterwards became deprived by a fire of the small patrimony that devolved to him. Undismayed, however, by these

misfortunes, he repaired in 1678 to Jena, to study medicine, and from thence proceeded to Erfurt, to become a pupil of the distinguished chemist Gaspard Cramer. He commenced practice at Minden in Westphalia, where he had influential connections, and where, in a very short time he acquired a high reputation. After a residence of little more than two years in Minden, during which time he visited Holland and England, he removed to Halberstadt. In 1693 Frederick, elector of Brandenburg, afterwards king of Prussia, appointed Hoffmann to the professorship of medicine in the newly constituted university of Halle. It was on his recommendation that the celebrated Stahl (q.v.), who had been his fellow-student at Jena, and subsequently became his great rival, was appointed one of his colleagues. At the urgent request of the king, he subsequently removed to Berlin, where he remained for three years; but finding that he could not pursue his studies in the atmosphere of the court, he returned to Halle; and although he subsequently attended the king at Berlin during a long illness, Halle was his residence during the remainder of his life. As a physician and a medical teacher, Hoffmann enjoyed a celebrity second only to Boerhaave, who contemporaneously occupied the chair of medicine at Leyden. It is unnecessary here to enter into his special doctrines, which are now of little practical value. Haller asserts that he amassed a large fortune by the sale of secret remedies, one of which is still designated Hoffmann's Anodyne Liquor (q.v.). Of his numerous works, the greatest is his *Medicina Rationalis Systematica* (Halle, 1718–40, 9 vols, 4to), which occupied him for more than twenty years, and was concluded in his eightieth year. His complete works have gone through various editions. His *Opera Omnia Physico-medica Denuo Revisa, Correcta et Aucta,* were printed at Geneva in 1640, in six folio volumes, and were reprinted after his death with five supplementary volumes of previously unpublished *Opuscula.* These were reprinted at Venice in 1745, in 17 volumes 4to, and twice subsequently at Naples on a still larger scale.

HOFFMAN'S ANODYNE LIQUOR, is the old name for the *Compound Spirit of Sulphuric Ether* of the London pharmacopœia, and is a mixture of ether, alcohol, and ethereal oil. It is often prescribed with laudanum, in order to prevent the nausea which the opium preparations frequently excite, and may be given in water, unassociated with anything else, as a stimulant and antispasmodic, in doses varying from half a dram to two drams.

HOFFMANNSEGG, JOHANN CENTURIUS, 1766–1849; b. Dresden; studied at Leipsic and Göttingen, and became celebrated as a botanist. He discovered and described a great number of new plants, and made valuable contributions to entomology.

HOFHOF, or EL-HOFHOF, the capital of the province of Lahsa Arabia, near the Persian gulf. Pop. 24,000. The fortifications once formidable are now in ruins. There are mosques and inclosed gardens, and all the features of an eastern town.

HOFLAND, BARBARA, 1770–1844; b. England, the daughter of a manufacturer. She published a volume of verses in 1805, and three years later married Hofland, the artist (her second husband). She published over 70 separate works, of which the larger portion were for young people. Some of the more notable were *The Daughter-in-Law, The Czarina, The Clergyman's Widow,* and *The Son of a Genius.*

HÖFLER, KARL ADOLPH KONSTANTIN, b. Bavaria, 1811; graduated at Munich, and studied in Italy. In 1836 he was the editor of the official gazette at Munich, and in 1840 professor in the university. In 1841 he was professor of history at Prague. He has written a number of works on political and historical subjects.

HOFMANN, AUGUST WILHELM, F.R.S., a distinguished living chemist, b. at Giessen in 1818. After obtaining the degree of doctor of philosophy, he became assistant to Liebig, in the Giessen laboratory, and subsequently he was appointed extraordinary professor of chemistry in the university of Bonn. When the royal college of chemistry was established in London in 1845, Hofmann was recommended by Liebig as highly qualified for the important post of superintendent to the new institution. This college, which has since merged into the laboratory of the royal school of mines, owes much of its high character to his teaching and his scientific reputation. On the elevation of prof. Graham from the post of chemist to the mint to the office of master of that institution, Hofmann was appointed his successor. In 1865 Hofmann accepted an appointment to be professor of chemistry in the university of Berlin, with the commission to found a chemical institute. He was a juror at all the international exhibitions (London, 1851 and 1862; Paris, 1865 and 1867). In conjunction with Dr. Bence Jones he edited the later editions of Fownes's *Manual of Chemistry.* His numerous contributions to the *Annalen der Chemie und Pharmacie,* to the *Transactions of the Chemical Society,* and to the *Philosophical Transactions of the Royal Society,* are for the most part on the very highest departments of organic chemistry; and in 1854 a royal medal was awarded to him for his *Memoirs on the Molecular Constitution of the Organic Bases.* It was in the course of these researches that he discovered in coal-naphtha aniline, the basis of the new colors mauve and magenta which had previously been only obtained from indigo. For his practical applications of this discovery, one of the great prizes was awarded to him at the Paris exhibition of 1867. Hofmann's *Introduction to Modern Chemistry* (1865; 5th ed., 1871) has led to great reforms in the teaching of chemistry.

HOF'WYL, a village of Switzerland, in the canton of Bern, and situated 6 m. n. of the town of that name. It has been long famous as the seat of the educational and agricultural institution founded here by the late M. Fellenberg (q.v.). Not many years after the death of M. Fellenberg, the institution was given up.

HOG, *Sus*, a genus of pachydermatous quadrupeds, of the family *suidæ* (q.v.). The neck is carried straight forward from the trunk, and is very thick and strong. The skin is very thick, and mostly covered with stiff bristles, among which a short curled hair is often also found. The bristles of the back of the neck generally become a mane in wild hogs, and particularly in the males, although, in domestication, this tends to disappear. The muzzle is elongated, and terminated by a movable cartilaginous disk, furnished, as in the mole, with a special small bone, and used, along with the tusks, as an implement for turning up the soil in search of roots and other food. There are 6 incisors, 2 canine teeth, and 14 molars in each jaw, the lower incisors projecting forwards; the canine teeth long and strong, projecting and curved, becoming formidable tusks in wild boars, and large and powerful even in the females in a wild state. The feet have each four toes, the lateral ones small, and scarcely touching the ground, all separately hoofed. The tail is short. The stomach shows mere traces of division. The food is chiefly vegetable, but perhaps no animals may more properly be called omnivorous; and although, even in a wild state, hogs are not to be reckoned among beasts of prey, they not unfrequently, even in domestication, kill and eat small animals that come in their way, as many a housewife has had occasion to observe in respect to chickens.—The common hog (*S. scrofa*) appears to be a native of most parts of Europe and Asia, and domesticated swine were found by the first navigators in many of the islands of the southern seas. The wild boar is still found in the forests of many parts of Europe, and was at one time an inhabitant of those of Britain, where it was protected by game-laws in the 10th and 11th centuries; but at what time it ceased to exist as a wild animal in Britain is uncertain. The adult males, in a wild state, are generally solitary; the females and young gregarious; and when assailed by wolves or other beasts of prey, wild swine defend themselves vigorously, the stronger animals placing themselves in the front, and the weaker seeking shelter in the rear. The chase of the wild boar is one of the most exciting sports of Europe or of India, particularly when carried on without the rifle, and on horseback with the spear ("pig-sticking"). The speed of the animal is very considerable, and the chase sometimes extends to 6 or 7 miles. Although the use of its flesh was prohibited to the Jews, and the prohibition has been adopted in the Mohammedan law, the hog has been a domesticated animal from a very early period, and its flesh constitutes a large part of the food of many nations. The fecundity of the hog is great; with proper treatment, it will produce two litters annually, generally of 4 to 8 pigs each, although sometimes there are as many as 14 in a litter. Vast quantities of the flesh are consumed in various forms in the British islands and North America, as pork, fresh or salted, bacon, ham, etc. Brawn (q.v.) is an esteemed English luxury. The fat of the hog, which is produced in a thick layer under the skin, is an article of commerce, and of various use under the name of Lard (q.v.). The skin of the hog is made into leather, which is particularly esteemed for saddles. The bristles, particularly of the wild boar, are much used for brush-making.

There are numerous varieties of the domestic hog, of which some have erect, and some pendant ears; and those are most esteemed which exhibit the greatest departure from the wild type, in shorter and less powerful limbs, less muscular and more rounded forms, etc. The *Chinese* breed and the *Neapolitan* have been of great use in the crossing and improving of the breeds commonly reared in Britain, giving rise to the improved white and black breeds respectively. Hogs are profitably kept wherever there is much vegetable refuse on which to feed them, as by cottagers having gardens, farmers, millers, brewers, etc. They are often allowed to roam over fallow ground, which they grub up for roots, and over stubble-fields, which they glean very thoroughly. They are also fed in woods—an ancient practice—where they consume acorns, beechmast, and the like. When they are fed, as is sometimes the case, chiefly on animal garbage, their flesh is less palatable and less wholesome.

The hog has a reputation which it does not deserve, of peculiar filthiness of habits. It is true that it wallows in the mire, as the other *pachydermata* also do, to cool itself and to provide itself with a protection against insects, and it searches for food in any puddle; but its sleeping-place is, if possible, kept scrupulously clean. The too common filthiness of pigsties is rather the fault of their owners than of their occupants; and a clean and dry sleeping-place is of great importance to the profitable keeping of hogs.

The hog is not inferior to other quadrupeds generally in intelligence. It can be easily rendered very tame and familiar. Its acuteness of scent has been turned to account in making it search for truffles; and an instance is on record of a pig having been used as a pointer, in which service it learned to acquit itself extremely well. Instances have occurred of the use of the hog as a beast of draught.

The forests of the island of Papua or New Guinea produce a species or variety of hog (*S. papuensis*), more widely different from the common hog than its breeds are from one another. It is 18 or 20 in. high, with short ears, and very short tail. The color is mostly brown. The Papuans have not properly domesticated this animal, although they often

trap the young ones and keep them till ready to be killed for use. The flesh is very delicate.

The babyroussa (q.v.) is another and very remarkable species of hog.

The *bosch vark*, or bush hog of South Africa (*choiropotamus Africanus*), is about 2 ft. 6 in. high, covered with long bristles; it has projecting tusks, a large callous protuberance on each cheek, and long sharp tufted ears. It is gregarious, subsists chiefly on vegetable food, and makes destructive inroads on cultivated fields.

HOGAN, JOHN, 1800–58; b. Ireland; studied sculpture in Rome, and received high praise from Thorwaldsen for his "Drunken Faun." He received a medal at the Paris exhibition of 1851.

HOGARTH, WILLIAM, a celebrated painter and engraver, born in London in the year 1697, served his apprenticeship to a silversmith in Cranbourne street, named Ellis Gamble, and next studied for some time under sir James Thornhill, the historical painter, but not with any marked success. About 1720 he set up for himself, and his first employment was to engrave coats of arms, crests, shop-bills, etc., after which he undertook to execute plates for booksellers, the chief of which are the prints illustrative of *Hudibras* (Lond. 1726). He now tried his hand at portrait-painting, and soon had ample employment, though he never cared anything for this branch of art. In 1730 he married (clandestinely) a daughter of sir James Thornhill, and soon after began to display his extraordinary talent for representing in pictures the follies and vices of his time. In 1733 appeared his "Harlot's Progress," a series of six pictures, which, like his other works, were engraved by himself. It was these engravings, and not the original paintings, that made Hogarth a rich man, and enabled him to keep his carriage at the age of 48. The "Harlot's Progress" was followed by other moral histories and satirical representations of vice and folly, such as "The Rake's Progress," published in eight engravings; "Southwark Fair;" "A Modern Midnight Conversation;" "The Distressed Poet;" and "Strolling Actresses in a Barn." The success of these was great, and inspired Hogarth with the belief that he could also win a reputation as an historical painter. After several ineffectual attempts, he recovered from his delusion, and returned to the path which nature had appointed him. In 1741 he published "The Enraged Musician;" in 1745, "Marriage à la Mode," in a series of six engravings, the pictures for which were purchased for the national gallery; and in 1748, "The March to Finchley. In 1753 he published his *Analysis of Beauty*, a work which excited much opposition and ridicule, and Hogarth is generally held to be erroneous in the conclusions at which he arrives. In 1755 appeared "Four Prints of an Election;" and in 1762, "The Times," a cutting satire upon Pitt. He died in 1764, and was buried at Chiswick, where a handsome monument was erected to his memory, with an inscription by his friend Garrick. In the technical part of his art, Hogarth was long thought not to have excelled, but modern opinion is more favorable in this respect. There has never, however, been any but one opinion regarding the greatness of his thought and invention, and his deep insight into the characteristics of his time and country. The moral of his satire is always stern, true, and unmistakable. A handsome edition of his works from the original plates, retouched by Heath, was published by Nichols (3 vols. Lond. 1820–22); others appeared at Leipsic (1831–35; 3d edit. 1841), and at Stuttgart (1839–40)

HOGG, JAMES, a Scottish poet, was born in the district known as the forest of Ettrick, in Selkirkshire, in 1772, and was at school for two or three winters before he reached the age of eight. At that early age he entered upon the occupation of shepherd. His first song appeared anonymously in 1801, and having gone shortly after to sell his employer's sheep in Edinburgh, he threw off 1000 copies of verses which he had written. In the same summer, Scott visited the Ettrick forest in search of materials for his *Border Minstrelsy*, when Hogg made his acquaintance, and placed in his possession a number of ballads, taken down from the recitation of persons resident in the district, which appeared in the third volume of the *Minstrelsy*, in 1803. In the same year, he published *The Mountain Bard*, the proceeds of which, together with two prizes for essays he received from the Highland society, amounted to £300. With this sum he took a farm, which proved a disastrous speculation. In 1810 he began a course of regular authorship. In 1813 his poem *The Queen's Wake* appeared. In 1814 he married; and although he afterwards went to live on a farm given to him by the duke of Buccleuch, he busied himself more with books and booksellers than with sheep and grazing. His pen was profitable, which was more than he could bring his farm to be. He died at Altrive, on Nov. 21, 1835. His works are numerous, comprising, in addition to those already mentioned, *Madoc of the Moor; The Pilgrims of the Sun; The Jacobite Relics of Scotland; Queen Hynde; The Border Garland;* and some songs of great beauty. He also wrote extensively in prose. His prose works are—*The Brownie of Bodsbeck; Winter Evening Tales; The Three Perils of Man; The Three Perils of Woman; The Altrive Tales;* a volume of *Lay Sermons*, and a *Life of Sir Walter Scott.*

After Burns, Hogg is unquestionably the greatest peasant-poet which Scotland has produced. His finest work, both in conception and finish, is *The Queen's Wake.* The general flow of the poem is lively and harmonious, while in one portion, that of "Kilmeny," the reader seems to hear "the horns of Elfland faintly blowing;" and in another, "The Witch of Fife," he is introduced into the weirdest, witch, and wizard world. His

prose works are very unequal, but they occasionally display great humor, and always abound in graphic description.

HOG-GUM, the name given in the West Indies to a resinous substance, which is there extensively used as a substitute for pitch, to tar boats and ropes, also for strengthening-plasters, etc., and internally as a diuretic, laxative, and stimulant medicine. It is still disputed what tree produces the true hog-gum; some ascribing it to *moronobea coccinea*, of the natural order *guttiferæ;* some to *rhus metopium*, a species of sumach, of the order *anacardiaceæ;* and some to *helwigia balsamifera*, of the order *amyridaceæ*. The probability seems to be that all these—and perhaps other—trees yield resinous substances of very similar quality, and commonly designated by the same name.

HOGMA'NAY, or HAGMENA, a word of doubtful derivation, applied in the n. of England and lowlands of Scotland to new year's eve. See NEW YEAR. It was customary for persons to go, on "hogmanay night," from door to door, asking in rude rhymes for cakes and cheese (and sometimes for money), on receiving which they passed on to the next house. This custom is rapidly dying out.

HOG PLUM, SPANISH PLUM, and BRAZILIAN PLUM, names given in the West Indies and other tropical countries to the fruit of certain species of *spondias*. The genus *spondias* belongs to the natural order *anacardiaceæ*, or, according to some botanists, to a small order called *spondiaceæ*, differing from *anacardiaceæ* in the want of a resinous juice, and in the drupe having a nut with 2 to 5 cells and seeds, instead of one cell and one seed. The species of *spondias* are trees and shrubs with pinnate leaves, which have a terminal leaflet, and flowers in racemes or panicles. Some of them produce very pleasant fruits, among which may be reckoned *S. purpurea* and *S. lutea;* the species generally called hog plum in the West Indies, because they are a common food of hogs, which revel in their abundance. *S. purpurea* has fruit about an inch in length, ovate or oblong, purple or variegated with yellow; the pulp yellow, with a peculiar but agreeable acid and aromatic taste. The fruit of *S. tuberosa*, called Imbuzeiro in the n. of Brazil, is about twice the size of a large gooseberry, oblong, yellowish, with a leathery skin and sweetish acid pulp. A much-esteemed Brazilian dish is prepared of milk, curds, sugar, and the pulp of this fruit, from which also a refreshing beverage is made for use in fevers. The tree is remarkable for the numerous round black tubers—about 8 in. in diameter—which it produces on its widely spreading roots, and which are very cellular, and full of water. They are evidently intended for the wants of the tree in the dry season, and are often dug out by travelers for the sake of the water, of which each tuber yields about a pint. Closely allied to *spondias* is the genus *poupartia*, to which belongs the Vi or Tahiti Apple, formerly *spondias dulcis*, a very fine fruit of the South sea islands.

HOG RAT, or HUTIA, *Capromys*, a genus of quadrupeds, of the family *muridæ*, differing from rats in having four grinders on each side in each jaw, with flat crowns. The tail is round and slightly hairy, and is used for support in sitting erect, as by kangaroos, and for aid in climbing trees, in which these animals are very expert. They make much use of their fore-paws, as of hands. Their food is entirely vegetable. They are natives of Cuba, where they are found in large numbers in the woods. They were much used as food by the aborigines. The best known species is of the size of a small rabbit.

HOGSHEAD, an old English measure of capacity. For wine, it was equivalent to 63 gallons; for ale and beer, to 54 gallons. In the United States, it is still used as a measure for liquids, equivalent to 63 gallons; but when used for tobacco, it varies in different states from about 750 to 1200 lbs.

HOGUE, CAPE LA. See CAPE LA HOGUE.

HOHENLINDEN, a village in Upper Saxony, with 250 inhabitants, famous for the victory gained there by Moreau over the archduke John, Dec. 3, 1800. After the expiration of the armistice concluded at Paersdorf, on Nov. 13, Moreau's army took up a position on the plateau between the Isar and the Inn, and the Austrian army, under the archduke John, on the right bank of the Inn. The Austrian main body advanced amidst drifting snow, and attacked the divisions of Grénier and Grouchy with the utmost fury; but the French receiving considerable reinforcements under Ney, the assailants were driven back; and being attacked in the rear, were totally routed. The victory was likewise decided at other points in favor of the French, who were only prevented from pursuit by inclement weather, bad roads, and the short winter day. The Austrians had 8,000 men killed and wounded, 11,000 made prisoners, including 180 officers, and 100 pieces of artillery. The French had 5,000 men killed and wounded. In consequence of this battle, the negotiations between the belligerent powers were resumed, and shortly after ended in the peace of Lunéville.

HOHENLOHE, an ancient German principality, in Franconia, now comprised chiefly in Würtemburg, partly also in Bavaria.

HOHENLOHE, a princely family of Germany, formerly in possession of the Hohenlohe principality, which was mediatized 1806. The ancestry of this noble house dates back to the early dukes of Franconia, and it was at first divided into two branches, the Hohenlohe-Hohenlohe, and the Hohenlohe-Speckfeld; but the former was soon

extinct, the last descendant dying in the fourth generation. Of the descendants of the Hohenlohe-Speckfeld branch, Georg, reigning duke in 1551, left two sons, who founded respectively the families of—I. Hohenlohe-Neuenstein-Oehringen, which died out in 1805, and of Hohenlohe-Neuenstein-Langenburg, now subdivided into Hohenlohe-Oehringen, and Hohenlohe-Langenburg; II. The branch of Hohenlohe-Waldenburg, since divided into Hohenlohe-Bartenstein, and Hohenlohe-Schillingsfurst. Of the elder branches, FREDERICK LUDWIG, prince of Hohenlohe Ingelfingen (1746–1818), distinguished himself at the battle of Weissenberg, and gained the victory at Kaiserlauten; but after the defeat of Jena, 1806, he retired from active participation in the campaign. Of the younger branches, ALEXANDER LEOPOLD FRANZ EMMERICH, descendant of the Hohenlohe-Waldenburg-Schillingsfurst family, is the best known (1794–1849). He was in priestly orders, and during the terrible epidemic fevers at Stuttgart, he devoted himself to the sick, and did much by his eloquence, both there and in Munich, to revive religious feeling. Miraculous cures were attributed to him, one of his first patients being the princess Schwarzenberg, a paralytic. His fame was increased by his sudden cure of an American lady, Mrs. Mattingley, at Washington, 1824. He published many controversial works, but did not succeed in obtaining the papal sanction for his treatment of disease. Another descendant of the same branch is the Bavarian statesman, KARL VICTOR, born 1819, one of Bismarck's firmest adherents, a member of the reichstag, and in 1871 its vice-president. He was a strong advocate of German unity, and although he was one of the first to introduce the Prussian military system into Bavaria, he favored the South German confederation. The present representatives of the family are, for the *Neuenstein branch:*

I. HOHENLOHE-LANGENBURG, Prince Hermann-Ernest-François-Bernard; married princess Leopoldina of Baden.

II. HOHENLOHE-OEHRINGEN, Prince Frederic-William-Eugene-Charles, duke of Ujest; married princess Pauline of Ujest.

III. HOHENLOHE-INGELFINGEN, Prince Charles-Adalbert-Constantine-Henry, lord of Klein Dronlowitz; born 1820.

IV. HOHENLOHE-KIRCHBERG, Princess Maria, countess of Urach.

For the *Waldenburg branch:*

I. HOHENLOHE-BARTENSTEIN, Prince John-Frederick-Michel-Charles-Marie.

II. HOHENLOHE-BARTENSTEIN-JAGSTBERG, Prince Albert-Vincent-Ernest-Leopold.

For the *Hohenlohe-Waldenburg-Schillingsfurst branch:* Prince Frederick-Charles; married princess Therèse of Hohenlohe-Waldenburg-Schillingsfurst.

HOHENSTAUFEN, a German princely house, which kept possession of the imperial throne from 1138 to 1254. The founder of the family was FREDERICK VON BÜREN, who lived about the middle of the 11th c., and assumed the name of Hohenstaufen from a castle of that name, the ruins of which are still to be seen on the summit of the Hohenstaufen berg (2,240 ft.), a hill on the left bank of the Danube, about 30 m. below Stuttgart. A son of his was the chevalier Frederick von Staufen, lord of Hohenstaufen, who steadfastly supported the emperor Henry IV., and in return received the duchy of Swabia. Duke Frederick, at his death in 1105, left two sons—Frederick II., the one-eyed, and Konrad; the former was immediately confirmed in Swabia by Henry V.; and in 1112 the latter received the duchy of Franconia. After the death of Henry V., his family estates fell to the house of Hohenstaufen; and Lothaire of Saxony was elected as his successor in the empire.

On Lothaire's accession, he revoked the grants made by previous emperors to the house of Hohenstaufen, and thus gave rise to a furious war, in which duke Frederick (his brother Konrad being absent in the Holy Land) had to encounter, single-handed, the whole power of the emperor, the house of Zähringen, and Henry the proud, duke of Bavaria and Saxony. After Konrad's return, fortune at first seemed to favor the brothers, but in 1135 they were compelled to implore the emperor's forgiveness. They were then put in possession of all their estates. Konrad, in 1138, was elected emperor of Germany, as Konrad III. The succeeding emperors of this family were Frederick I. (q.v.) (1152–90), Henry VI. (1190–97), Philip I. (1198–1208), Frederick II. (q.v.) (1212–51), and Konrad IV. (1251–54).

HOHENSTEIN, a small manufacturing t. in the kingdom of Saxony, 12 m. n.e. of Zwickau. Woolen, cotton, and linen goods, and machinery, are the principal manufactures. Pop. '71, 5,669.

HOHENZOLLERN, a province of Prussia, consisting of a narrow strip of land entirely surrounded by the territories of Würtemberg and Baden. Superficial area about 480 sq.m.; pop. '75, 66,466. The territory, whose surface is generally mountainous, is divided into the districts of Sigmaringen and Hechingen, which rank as mediatized principalities. The seat of provincial government is at Sigmaringen. Hohenzollern is watered by the Neckar and some of its affluents, and by the Danube, which crosses it; it is also traversed by the eastern offshoots of the mountain-ranges of the Black forest, the Rauhe Alb, and the Hart. The mountain valleys are productive, and yield an abundance of fruit and corn, and flax in sufficient quantities for exportation; the forests abound in fine timber; there are iron mines in some of the mountain districts, which also yield gypsum, salt, and coal. The principal branches of industry are agri-

culture and the rearing of cattle, and the manufacture of toys and other articles in wood.

The population belongs almost exclusively to the Roman Catholic religion, and is under the jurisdiction of the archbishop of Freiburg. There is a Catholic college at Hechingen.

The Hohenzollern family traces its descent from count Thassilo, who lived about the beginning of the 9th c., and founded a castle near Hechingen, on the Zollern heights, whence his descendants derived their patronymic. About 1165 the first separation took place, Frederic IV. founding the elder or Swabian, and Konrad I. the younger or Franconian line. The elder line was subdivided, in 1576, into the branches of Hohenzollern Hechingen and Hohenzollern Sigmaringen. Frederic VI., the representative of the younger line, in 1415 received from the emperor Sigismund the investiture of the electorate of Brandenburg, thus founding the present reigning dynasty of Prussia. The two branches of the elder line continued unbroken till 1849, when, in accordance with a family compact formed in 1821, which declared the king of Prussia chief of the joint houses, the reigning princes of Hohenzollern Hechingen and Hohenzollern Sigmaringen ceded their respective rights and principalities to that monarch, who agreed to pay an annual pension of 15,000 thalers to the former, and one of 25,000 thalers to the latter. The princes were to retain their estates and bear the title of highness, but were to exercise no act of sovereignty.

HO'HESCHIED, a t. of Rhenish Prussia, 17 m. e. by s. from Düsseldorf. It has extensive lead-works and iron-works. Pop. '75, 9,958.

HO'JO, a family of twelve Japanese rulers who held military authority in Japan from A.D. 1219 to 1333, living at Kamakura. They were overthrown by Nitta Yoshisada in 1333. Under their direction, the great Mongol invasion of Khublai Khan was repulsed.

HOKIAN'GA, a river of New Zealand, enters the Southern ocean on the w. coast of the North island—its mouth being in lat. 35° 30′ s., and long. 173° 26′ east. This point is almost the antipodes of Tangier, on the s. side of the strait of Gibraltar.

HOK'USAI (wrongly written Hokffsai or Hokesai), a Japanese artist who flourished during the first half of this century in Yedo, though he traveled largely over his native country sketching scenery, costume, and character; one of the ablest, most original, and versatile of the long roll of artists of Japan. His sketches have become familiar in Europe and America, since they have furnished magazine writers, artists, decorators, and designers in oil-colors, wood-engravings, silver-ware, embroidery, etc., with models, suggestions, and ideas. Hokusai's sketches are collected in the *Hokusai Tchon*, or series of albums embracing the entire range of Japanese pictorial art, and containing most of the stock subjects of Japanese artists. His *Fuji Hiakke* is a collection of "One Hundred Views of Fuji." See FUGI YAMA. See illustrations in Alcock's or Griffis's works on Japan, Jarvis's *A Glimpse of the Art of Japan*, Noah Brooks's articles in *Scribner's Magazine*, or any recent pictorial work referring to Japanese art or decoration.

HOLBACH, PAUL HEINRICH DIETRICH, Baron von, a French philosopher of the 18th c., was b. of wealthy parents, at Heidelsheim, in the Palatinate, in 1723. At an early age he went to Paris, where he continued to reside during the remainder of his life. He died June 21, 1789. As Holbach was remarkable for his agreeable social qualities, and kept a good table, the most eminent thinkers and writers of the day, such as Condorcet, Diderot, Duclos, Helvetius, Raynal, Rousseau, Buffon, etc., were in the habit of assembling at his house. The witty abbé Galiani called Holbach the *maître d'hôtel* of philosophy. Here speculation, it is said, was carried to such daring lengths that Buffon, D'Alembert, and Rousseau were compelled to withdraw from the circle. Holbach was the zealous champion of naturalism, and contended not only against Christianity, but against every positive religion. His principal work is the *Système de la Nature* (published in 1770). In this work the author endeavors to expound the natural principles of morality, and to investigate the origin of the conflicting opinions on virtue and vice. He discusses the maxims of religious morality, and takes a rapid survey of social and savage life. He touches on the so-called "social compact," and in the course of his observations tries to prove, among other things, that self-interest is the ruling motive of man, and that God is only an ideal being, created by kings and priests. The materialism of the French *philosophes* of the 18th c. is nowhere more pernicious and paltry than in the writings of Holbach. It is but fair to state that his life was better than his books. He was a man of good heart and, in spite of his theory, of most unselfish benevolence. When the Jesuits fell into disgrace during the reign of Louis XV., Holbach, though he hated their system and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered round them.

HOLBEIN, HANS, the Younger, one of the first masters of German art, was b. at Grünstadt in 1497. He learned the rudiments of art from his father, Hans Holbein the elder, also a painter of great merit (b. 1450, d. 1526). When little more than 16 years of age, he adorned several houses and churches at Basel with portraits, frescos, and altar-pieces. Tradition has preserved many of his droll sayings, and his life is as

rich in anecdotes as those of the greatest Italian painters. Holbein growing tired of Basel, Erasmus, who took a great interest in him and endeavored to induce him to abandon his irregular course of life, introduced him to sir Thomas More, who kept him employed in England for nearly three years, and then invited Henry VIII. to view the pictures. Henry, surprised and delighted, exclaimed: "Is the artist still alive, and is he to be had for money?" More presented Holbein to the king, who took him into his service and rewarded him liberally. Holbein continued to reside in England, highly esteemed and fully employed, till, in 1554, he died with the plague. Though chiefly, and at many periods of his life almost exclusively, a portrait-painter, in this style he stands on a level with the great Italian masters, and takes precedence of all his German contemporaries. His portraits are not ideals, but nature apprehended in its most intellectual features; the execution is rich and perfect. To the earlier part of his career belong his most celebrated paintings, including "The Last Supper," "The Dance of Death," several pictures in the Dresden gallery, two famous portraits of courtesans, etc. At a later period his execution is slighter, and his style of coloring not entirely free from the mannerism of those Flemish painters who had studied in Italy. Some splendid and able portraits by Holbein, belonging to this period, are to be seen in the Louvre at Paris, in the Berlin museum, at Longford and Windsor castles. Eighty-seven sketches of persons belonging to the court of Henry VIII. by Holbein are still extant. His "Dance of Death," the illustrations of the Old Testament, and three sets of alphabet initials, would certainly entitle him to rank as one of the first wood-engravers, supposing them to have been not merely designed but likewise engraved by him. This opinion has, however, been disputed, and the question remains undecided at the present day. A selection from Holbein's pictures in the library at Basel was published in lithographs in 1829, by Birmann & Sons, at Basel.—See Wolkmann, *Holbein und seine Zeit* (Leip. 1873–76).

HOLBERG, Ludvig, the creator of modern Danish literature, and not only the earliest but the wittiest and best writer of light comedy in Denmark, was b. in 1684 at Bergen, in Norway, at the period when the latter country formed part of the Danish dominions. The ten years which succeeded his appointment, in 1718, as professor of metaphysics in the university of Copenhagen, where he had studied with the original intention of entering the church, embrace the most active literary period of his life; for during that time he composed his various satirico-heroic poems and romances, and the greater number of his numerous comedies, which are still regarded by his countrymen as the best productions of their kind in the Danish language. The creation of a national theater in 1722 by king Frederick IV., who sent for French actors to teach Danish players the art of declamation, had led Holberg to try his talents in dramatic writing, and the success which attended the attempt was speedily followed by others still more felicitous. Wealth and honors poured in upon him as he advanced in years, and he received a patent of nobility in 1746. He died in 1754, bequeathing his property to the Danish royal military academy of Soroe. Holberg's collected works were published in 27 volumes octavo at Copenhagen in 1826; and in 1842 an association was established in that city for the better editing of his writings, the dramatic portion of which was edited by Liebenberg in 1843–47.

Holberg's first satirico-heroic poem of *Peder Paars* (1719), and his *Niels Klims underjordiske Reise* (1741), which appeared originally in Latin, but which was speedily translated into several modern languages, rank among his best productions, although among his numerous comedies there are many that have enjoyed an almost equal popularity. Of these we may instance, as especially notable for their broad humor and truth to nature, *Den politiske Kandestoober*, *Jeppe paa Bjerget*, *Den Stundesloese*, and *Julestuen*.

HOLBROOK, John Edwards, 1796–1871; b. S. C.; graduated at Brown university; studied medicine, traveled in Europe; practiced in Charleston, and became professor of anatomy in the state medical college. He published *American Herpetology, or Description of Reptiles of the United States*, and began an elaborate work on *Southern Ichthyology*.

HOLCOMBE, Amasa, b. Mass., 1787; a compiler of almanacs and teacher of engineering, surveying, and astronomy. In 1828 he began the making of telescopes, and was long without a rival in the United States. He was a member of the Massachusetts legislature, serving both in the house and the senate.

HOLCROFT, Thomas, 1745–1809; b. England; the son of a shoemaker and a follower of the same trade. Turned his attention to horse-training, then became successively a schoolmaster, an actor, and lastly a writer for the stage. He produced several excellent plays, one of which, *The Road to Ruin*, still keeps the stage. In the time of the French revolution he was indicted for high treason, but was never called up for trial. Besides some 30 plays he wrote four novels, and translated Lavater's *Physiognomy* and some of the works of Frederick the great. He also wrote *Travels in France and Germany*.

HOL'CUS. See Soft Grass.

HOLD is that interior compartment of a vessel throughout her length which is nearest to the keel. From the lowermost deck it extends to the very bottom of the ship; it is

always below the water-line, and dependent on the hatchways for ventilation and what little natural light it obtains. In merchant-vessels, the greatest portion of the cargo is stored in the hold; in men-of-war, it contains the bread-room, filled with provisions, the water-tanks for the supply of the ship's company, and almost all miscellaneous stores, such as spare masts, sails, blocks, etc. For this latter purpose, the hold is subdivided into several sections by bulkheads. The *after-hold* lies abaft the main-mast, the *main-hold* just before the same mast, and the *fore-hold* is from the bow nearly to the main hatchway.

HOLDEN, OLIVER, b. Mass., 1831; the author of the popular psalm-tune *Coronation* and of some other pieces. He published *American Harmony*, the *Worcester Collection*, and other books of music.

HOLDING, the term in Scotch law used to denote the manner in which heritable estate is holden, corresponding to the English tenure (q.v.). All the land in Scotland is presumed to be holden of the crown as the superior, and all persons who hold the lands are called vassals. The great proprietors are called crown-vassals; and the little proprietors, who generally hold under the crown-vassals, are called vassals. The chief holding is called feu-holding, which means that the vassal holds the land forever, subject to a feu-duty or annual payment in money or grain to the superior. Each vassal can carve out his land into smaller feus, and sell them to subvassals, to whom he stands in the relation of a superior, and so on to infinity. This is not a mere form, but enters into the substance of land transfers, and entails great expense on all landholders, because each vassal must always have his title complete, which means he must pay up the little dues and perquisites which constantly result out of this feudal principle to his superior. In England this practice of subinfeudation was put a stop to by 18 Edw. I., and now most of the land in England is held in freehold, which means that each owner is entire master of his land, and pays fees or perquisites to nobody, not even to the crown. Besides feu-holding in Scotland there is blench-holding, which means a holding where the payment is nominal. Formerly there were also ward-holding and mortification (q.v.), the latter being the holding by which churches and religious houses were held. There is also burgage-holding, applicable to lands within burghs (q.v.), and the transfer of burgage tenements has been lately put on a similar footing to other tenements.

HOLDING OVER, a phrase in English law, meaning that a tenant after a regular notice to quit, or the end of his term, still refuses to quit, and holds over. In such a case the tenancy is held to be renewed on the same terms from year to year, if the landlord chooses not to enforce the quitting; but if the tenant himself gave the notice to quit, or the landlord demands possession at the expiration of his notice, and then the tenant refuses to quit, he is thereafter liable to double rent or double value, according as the notice to quit came from the tenant or the landlord. In Scotland this renewal of the contract is called *tacit relocation* (q.v.); but no liability to double rent is incurred.

HOLIDAY, in law, means Christmas day, Good Friday, and any other day appointed for a public fast and thanksgiving. There are other holidays usual in public offices and courts of law. When a bill of exchange falls due on a Sunday, payment must be made the day previous. If it falls due on any of the bank holidays, the bill is payable the day after. In England the courts excuse a man for not giving notice of dishonor of bills of exchange not only on Sunday, Good Friday, and Christmas day, but also even on the festival days of his own religion; and though there has been no decision in Scotland on the subject, the same rule would no doubt be applied to fast-days prescribed by different sects, and a notice sent on the day following would suffice. But as a general rule, and in all other respects, it may be laid down that no sect, established or unestablished, nor any court or public body, has any power whatever to declare a holiday which has any legal effect, or which can bind the public or the rights of third parties. Nothing but an act of parliament has that effect, and not even a proclamation of the crown would be sufficient. Hence it is that when a solemn national fast is proclaimed, which is to be put on the same footing as a Sunday, it requires a special act of parliament to make it binding on the public in matters of business.

HOLINSHED, RAPHAEL, an English chronicler, was b. of a Cheshire family, in the early part of the 16th c., and died between 1578 and 1582. The work by which he is remembered is entitled *The Chronicles of Englande, Scotlande, and Irelande* (2 vols. fol., Lond. 1577). This edition—the first—is known as the "Shakespeare" edition, from the fact of its having supplied the great dramatist with materials for his historical plays. It contained some passages disagreeable to queen Elizabeth, which were omitted in the second edition of 1587. A modern edition, in 6 vols., was published in 1807–08, with the "disagreeable passages" restored. Holinshed, although the principal, was not the only author of these chronicles. He was assisted in his labors, among others, by William Harrison, who wrote the historical descriptions of the island of Britain; and by Richard Stanihurst, who contributed an account of the condition of Ireland, to which John Hooker added the "Conquest of Ireland" (a translation from the Latin of Giraldus Cambrensis). Holinshed has always been a great favorite with black-letter scholars, and has been freely used by modern historians.

HOLKAR, the name of a powerful Mahratta family, the members of which have at various times been formidable enemies to the British empire in Hindustan. The founder of the family was MULHAR RAO HOLKAR, who was born in the Deccan, 1693, and having gained by his valor the favor of the Peishwah, obtained from him the western half of Malwah, with Indore for his capital. In 1761 he joined the great league of the princes of Hindustan, formed to bar the progress of Ahmed Shah Durani, and was present at the battle of Paniput, Jan. 14, 1761; but as he fled shortly after the battle had commenced, he was suspected of treason. Holkar was the only Mahratta chief of note who returned from that dreadful slaughter. He died in 1768, and was succeeded by his niece, Aylah-Baee, who resigned the military power to TOKHAGI HOLKAR. On his death in 1797, his natural son, JESWUNT RAO HOLKAR, a man able, brave, and unscrupulous, seized Indore, but was driven out by Scindia. Such, however, was Holkar's reputation for energy and ability that part of the victorious army deserted to him, with whom and his own troops he obtained a signal victory over Scindia and the Peishwah (Oct. 1802). After fighting a long time against the British with varying success, he was compelled to conclude peace, and died insane, Oct. 20, 1811. His son, MULHAR RAO HOLKAR II., a minor nine years old, succeeded, and in 1817 declared war against the British, but his army was totally routed at Mahedpore, Dec. 21; whereupon he sent offers of peace, which were accepted, and *an English residency was established at Indore in Jan.*, 1818. He died in 1833. MARTUND RAO HOLKAR, HURRI RAO HOLKAR, and KUMDI RAO HOLKAR successively ruled after him; but the last of these dying without heirs, the East India Company assumed the right of nominating MULKERJI RAO HOLKAR, who was educated under the auspices of the British government, and who has displayed great ability since he assumed the reins of government in 1852. On the breaking out of the mutiny in 1857, he took the field in support of the British, but the refractory behavior of his troops prevented his rendering any effective assistance.

HOL'LAND, a name frequently applied to the kingdom of the Netherlands (q.v.), although in the strictest sense it is applicable only to the provinces of North and South Holland (q.v.).

HOLLAND, a city in Ottawa co., Mich., on Black river, and the Michigan shore railroad, about 4 m. from lake Michigan; pop. 2,469. It has a considerable number of manufactories, six churches, and four newspapers, two of which are in the Low Dutch language. A little lake 6 m. long, and of celebrated beauty, is near the city.

HOLLAND, Sir HENRY, Bart., M.D., F.R.S., D.C.L., etc., an eminent physician, b. at Knutsford, Cheshire, in 1788. He received his professional education in London, and subsequently at the university of Edinburgh, where he graduated as M.D. in 1811. He then spent two or three years in the e. of Europe; and in 1815, after his return to England, published his *Travels in Albania, Thessaly, etc.*, in a 4to volume. He settled in London, and soon rose to high eminence in his profession, of which he became one of the recognized heads. In 1828 he was elected a fellow of the royal college of physicians, a distinction at that time very rarely conferred upon a Scottish M.D. In 1840 he was appointed physician-in-ordinary to the prince consort, and in 1852 physician-in-ordinary to the queen. In the following year he was made a baronet. In 1856 the university of Oxford conferred on him the honorary degree of D.C.L., and he has likewise received the degree of LL.D. from the university of Cambridge, Mass. In 1840 he published a volume entitled *Medical Notes and Reflections*, consisting of 34 essays upon various of the most interesting departments of medicine and psychology, which has passed through several editions. In 1852 his *Chapters on Mental Physiology* appeared, which are expansions of those essays in his former work which treated of "that particular part of human physiology which comprises the reciprocal actions and relations of mental and bodily phenomena." His *Essays on Scientific Subjects*, published in 1862, and embracing the consideration of many of the most profound subjects in physics, show that if his special studies had taken a different direction, he would have attained fame as a natural philosopher. The *Recollections of Past Life* he published in 1871. Holland died Oct., 1873.

HOLLAND, Lord, HENRY RICHARD FOX, VASSALL-HOLLAND, Third Baron, F.R.S., an English statesman, was descended from Henry Fox, first baron, secretary of state to George II. Holland was born at Winterslow House, Wilts, in 1773, and succeeded to the title on the death of his father, the second baron, in 1774. He went to Eton, and thence to Christchurch. He was trained for public life by his celebrated uncle, Charles James Fox, and made his first speech in the house of lords in Jan., 1798. After the death of Mr. Fox, Holland held the post of lord privy seal in the Grenville ministry for a few months. He then shared the long banishment of the whigs from the councils of their sovereign. During this long and dreary interval, Holland, to use the language of Macaulay (who has paid an elegant tribute to his memory), was the "constant protector of all oppressed races and persecuted sects." He held unpopular opinions in regard to the war with France, and signed a protest against the detention of Napoleon at St. Helena. On the other hand, he labored to ameliorate the severity of the criminal code; made manful war, though a West India planter, on the slave-trade; threw his whole heart, though a landowner, into the struggle against the corn-laws; and although by rank and breeding an aristocrat, labored incessantly to extend and confirm the rights and lib-

arties of the subject. In 1830 he became chancellor of the duchy of Lancaster, and a member of the reform cabinet of earl Grey, and these posts he also held in the Melbourne ministry. He died at Holland house, Kensington, Oct. 22, 1840. In his ample person and expressive features he resembled his celebrated uncle.

HOLLAND, JOSIAH GILBERT, b. in Belchertown, Mass., July 24, 1819. His father, whose character is sketched in "Daniel Gray," was equally willing and unable to help his ambitious son to rise above his own humble lot in life. After many struggles, however, he graduated with honor from the Berkshire medical college, in Pittsfield, in 1844. He showed talent for writing at an early age, and in 1847 founded the *Bay State Courier*, which he gave up at the end of six months, and passed a year in Vicksburg, Miss., as superintendent of public schools. In 1849 he accepted the position of assistant editor on the *Springfield Republican*, and two years later became one of the proprietors of that paper. It was in the columns of the *Republican* that his *History of Western Massachusetts* first appeared. He became widely known as a lecturer. In 1868 he went to Europe for two years, and it was during this trip that he conceived the idea of *Scribner's Monthly*, which immediately upon his return was carried into effect. In Nov., 1870, the first number appeared, amid many prophecies of failure because there was no room for such a publication. It made room, however, and *Hours at Home*, *Putnam's Magazine* and *Old and New* successively resigned to it their respective subscription lists. Dr. Holland resides in New York city, and spends the summer at his place called "Bonnicastle," on one of the Thousand islands, which he recently purchased. His works, some of which were published under the assumed name of Timothy Titcomb, are: *The Bay Path*, a novel; *Letters to the Young; Bitter Sweet*, a poem; *Gold Foil; Miss Gilbert's Career*, a novel; *Lessons in Life; Letters to the Joneses; Plain Talk on Familiar Subjects; Life of Lincoln; Kathrina*, a poem; *The Marble Prophecy; Arthur Bonnicastle; Garnered Sheaves*, a poem; *The Mistress of the Manse; Sevenoaks;* and *Nicholas Minturn*.

HOLLAND, Sir NATHANIEL DANCE, 1734–1811; b. England; the son of George Dance, architect of the Mansion-house in London. He studied painting in Italy for several years, and on his return became distinguished, especially as a portrait-painter. After marrying a rich heiress, he relinquished his profession, and assumed the name of Holland, was made a baronet, and entered parliament. His portrait of Garrick in the character of Richard III. is one of his best works, and gives a good example of his style.

HOLLAND, PHILEMON, 1551–1636; b. England; the "translator-general of his age," as he was called by his contemporaries He was educated at Trinity college, of which he became a fellow. On being appointed to the rectorship of the free grammar-school of Coventry, he began a long series of translations from the classics. He also found time to carry on a very considerable practice as a physician. By a proper use and distribution of his time he reconciled his three professions of schoolmaster, doctor, and translator, fulfilling the functions of all three with undiminished vigor and assiduity till his 80th year. His chief translations are those of Livy, Plutarch's *Morals*, Suetonius, Ammianus Marcellinus, and the *Cyropædia* of Xenophon. He also did good service to literature by his edition of Camden's *Britannica*, to which he made some valuable additions.

HOLLAND, PARTS OF. See LINCOLNSHIRE.

HOLLAND, NEW, the name formerly applied to the island or continent of Australia (q.v.).

HOLLAND, NORTH, a province of the kingdom of the Netherlands, lying between 52° 10′ and 53° 18′ n. lat., and 4° 30′ and 5° 20′ e. long. Area, 1050 sq.m.; pop. '75, 629,345. North Holland consists of a peninsula joined to the mainland at its southern extremity, and of the islands of Wieringen, Texel, and Vlieland lying at its northern extremity. It is bounded on the w. by the German ocean, and on the e. by the Zuyder Zee. The surface is marshy, and in many places lies below the level of the sea, from whose encroachments it is protected by dunes and dikes, while canals intersect and drain it in every direction. The principal river is the Amstel. The canal from Amsterdam to Nieuwediep is an important water-way, but is now superseded (for large ships) by one through the peninsula, opened Nov. 1, 1876.

The Haarlem lake (q.v.) has been drained and converted into productive land, with a pop. (Dec. 31, 1874) of 12,570; but there still exist various small lakes or ponds in the marshy districts. The chief towns of the province are Amsterdam, Haarlem, Alkmaar, Zaandam or Saardam (q.v.).

HOLLAND, SOUTH, a province of the kingdom of the Netherlands, lying between 51° 45′ and 52° 20′ n. lat., and 3° 50′ and 5° 10′ e. long. Area, 1162 sq.m.; pop. '75, 748,162. It is bounded on the n. by North Holland, e. by Utrecht and Gelderland, s. by the Maas, which separates it from Zeeland and North Brabant, and w. by the German ocean. South Holland comprises the land around the embouchures of the Rhine and Maas, which is cut up in its southern portions into several islands—viz., Voorne, Overflackkee, and Goeree, Putten, Ysselmonde, Beijerland, etc.

The country is flat and low, and is broken by no elevation beyond the downs, which protect it from the sea. Streams and canals intersect it in all directions, and it abounds

with lakes and with *polders*, or lands that have been recovered from the sea or lakes by draining. One of the most noted of these is the Biesbosch, land recovered from a marshy lake which was formed by the terrible inundation of 1421. The chief rivers are the Old Rhine, the Yssel, Lek, Maas, and Merwede. The principal towns of South Holland are the Hague, Leyden, Rotterdam, Dordrecht, Gorinchem, Brielle, Gouda, Delft, and Schiedam (q.v.). The two provinces of Holland rank among the most populous districts of Europe, and their inhabitants are distinguished for industry and habits of great cleanliness. The rearing of cattle, of which there are upwards of a million in North and South Holland, and the preparation of butter and cheese, are the principal industries in the rural districts. Alkmaar, in North Holland, and Gouda, in South Holland, are the great centers of the cheese trade. In 1874 the cheese sold at Alkmaar weighed 8,705 cwts. The provinces of Holland enjoy the largest share of the national commerce and wealth.

HOLLANDS. See GIN.

HOLLAR, WENCESLAUS OR WENZEL, a celebrated engraver; b. 1607, in Bohemia. He was apprenticed to Matthew Marian, a pupil of Rubens and Vandyck, to learn engraving. He was only 18 when he published his first pieces, consisting of prints of the Virgin, the "Ecce Homo," and some other pieces. Leaving Prague he began a wandering life through Germany, taking views of the chief towns and of the most striking scenery of the Danube, Rhine, and other streams, which brought him great fame but no regular employment. Hollar's fortunes were at a very low ebb when he fell in with the earl of Arundel, who attached him to his service. Soon after reaching England with his patron he was appointed to instruct the prince of Wales in drawing; and in 1640 published his *Ornatus Muliebris Anglicanus, or the several habits of Englishwomen from the Nobilitie to the Countrywoman, as they are in these Times*. After the outbreak of the civil war he incurred the suspicions of parliament, and was imprisoned for a short time. Making his way to Antwerp, where lord Arundel was then residing, he wrought quietly and assiduously for print-sellers and publishers during several years. His pieces never having fetched prices at all proportionate to their merits, he was forced, in order to make a living, to place a price upon his time. He fixed his tariff at fourpence an hour, which he marked by a sand-glass. So exact was he that when any one, even his employers, came to speak with him about the picture on hand, he always turned down his glass, charging payment only for the time he was actually engaged with his burin. It was in this humble way that he produced his fine engravings after Da Vinci and the great masters of portrait-painting. On returning to England after the restoration, Hollar worked with the same unflagging industry, and with no more profitable result than in his younger days. His plates in Dugdale's *Monasticon* and *History of St. Paul's* attest his diligence. In 1669 he was commissioned by Charles II. to take plans and perspective drawings of Tangier and its fortifications, which, on his return to England, he engraved. His last known engravings are his unfinished illustrations of Throton's *Antiquities of Nottinghamshire*. These and other works occupied him till his 70th year, but without gaining for him an independence. On his very deathbed an execution was served upon his house. His last words were a petition to be allowed to die in his bed, and that he might not be removed to any other prison but his grave. It is not known whether this prayer was granted.

HOLLEY, ALEXANDER LYMAN, b. Conn., 1832; graduated at Brown university, and was educated as an engineer at the Corliss steam-engine works. He was the first who introduced the Bessemer process into America, and built the first Bessemer-steel works in this country, erected at Troy, N. Y., and, at a later period, similar works at Pittsburg, Harrisburg, Chicago, and elsewhere.

HOLLIDAYSBURG, the seat of justice of Blair co., Penn., on a branch of the Juniata river, and a branch of the Pennsylvania railroad; pop. '70, 2,952. There is a large trade by rail and canal; coal, iron, and grain are the main products. There are several foundries, blast-works, and rolling-mills, and some other manufactures.

HOLLIS, THOMAS, 1659–1731; b. England; a rich merchant of London who made bountiful bequests to Harvard college, of which the Hollis professorship of divinity is a memorial. He was a Baptist, but all he required was that the professor should be of sound orthodox principles. In 1727 he provided for a professorship of mathematics and philosophy, and gave many books to the library. One of his nephews was also a donor to the college.

HOLLOWAY, THOMAS, 1748–1827; b. London; celebrated as an engraver. His chief work was in the illustration of Lavater's *Essays on Physiognomy*, for which he made about 700 plates. He also engraved some of Raphael's cartoons.

HOLLOW-WARE. There are two classes of iron goods so-called—viz., cast-iron hollow-ware and wrought-iron hollow-ware. Both kinds include cooking and other vessels for domestic use, and comprise also some other articles, such as coffee-mills, which are molded and finished in a similar way. Wrought-iron hollow-ware is largely made by the process of stamping (q.v.), but a great deal is also made by the older way of joining pieces together. Vessels of this kind not intended for cooking are generally coated with zinc, while those which are have usually a coating of tin. Both metals are

put on the iron by immersion. There is also a process in use for coating the surface with silicious enamel, which will be described presently. Since the introduction of these methods of protecting and beautifying the surface of iron, domestic vessels of this metal have greatly taken the place of those made from copper and brass.

Cast-iron hollow-ware is finished in three ways—some of it is enameled, some tinned, and some of it is left *black*, or untinned; but there is comparatively little of the last now used. The process by which tinned hollow-ware is made was patented by Jonathan Taylor, a Birmingham workman, in 1779. It is conducted as follows: A vessel, such as a saucepan or goblet, is cast in a mold prepared in the ordinary way from an iron or a brass pattern. See FOUNDING. The vessel is then annealed (q.v.), so as to soften the cast-iron preparatory to turning, and such articles are then turned quite smooth on the inside, by means of a common lathe when they are circular, and by an oval lathe when they are oval like fish-pans, a workman holding and directing the tool in both cases. Self-acting lathes have been tried, but hitherto without any saving in the cost. The operation of tinning follows next, and is performed by the workman pouring small quantities of melted tin on the inside of the vessel, which he rubs on with a piece of cork, gradually going over the whole surface. A little sal-ammoniac is thrown in during the process to make the tin adhere. Handles of malleable iron are then put upon such vessels as require them, and a final finish is given to them by coating the outside with a black varnish which is dried in a stove. The covers of saucepans are made of tin-plate, those for tea-kettles of cast-iron.

With respect to the enameling of cast hollow-ware, a patent was taken out for this as far back as 1799; but the process then introduced, in which the enamel contained lead and tin, was ultimately abandoned. The subsequent patent of Messrs. T. & C. Clark, of Wolverhampton, taken out in 1839, has been more successful. Their enamel is applied to the cast-iron in two coatings, one of which forms the body of the enamel, and the other the glaze, both being free from metallic oxides. It is especially desirable to avoid the oxide of lead, as it does not resist the action of acid substances in culinary operations. As iron, in common with most metals, differs from any vitreous enamel in the rate of its expansibility by heat, there is of course a difficulty in securing the permanent adhesion of the two substances, especially with such an article as a cooking-vessel. In the case of cast-iron vessels, the difficulty has been practically overcome.

In England cast hollow-ware is made chiefly in the Midland hardware district, of which Birmingham and Wolverhampton are the centers. About 2,500 hands are employed, and the quantity of materials annually consumed is estimated at 12,000 tons of pig-iron, 1000 tons of wrought-iron, 177 tons of tin, and 23,000 tons of coke and coal. In Scotland there are also several manufactories of tinned hollow-ware, that of the Carron company having long been famous. Wrought-iron hollow-ware is made principally in Birmingham and the surrounding district, and the number of hands employed upon it is probably nearly the same as for cast-iron goods of this kind.

With regard to the comparative merits of the different varieties of hollow-ware, there is no doubt that the kind made of enameled cast-iron is, on the whole, the best for cooking purposes, although it is about one-fifth dearer than when merely tinned, and is, moreover, not liked by cooks for any but small-sized vessels, on account of its being somewhat heavy. Enameled wrought-iron cooking-vessels are much lighter to handle, but then upon them the enamel does not stand nearly so well, very probably because the comparatively rapid heating up of the thin iron of which they are made more rapidly destroys the adherence of the two substances. A great deal of cast-iron tinned hollow-ware is now made without being turned, an omission easily detected.

HOLLY, *Ilex*, a genus of trees and shrubs of the natural order *aquifoliaceæ*, chiefly natives of temperate climates; with evergreen, leathery, shining, and generally spinous leaves; small flowers which have a 4- to 5-toothed calyx, a wheel-shaped 4- to 5-cleft corolla, 4 or 5 stamens, and the fruit globose and fleshy, with 4 or 5 stones (*nuts*). The COMMON HOLLY (*I. aquifolium*), the only European species, and a native also of some parts of Asia, is a well-known ornament of woods, parks, and shrubberies in Britain, the stiffness of its habit being so compensated by the abundance of its branchlets and leaves, as to make it one of our most beautiful evergreens. It is found as a native plant in Scotland, although Britain is nearly its northern limit; and it attains a greater size and displays greater luxuriance in the northern than in the southern parts of its geographic range, often appearing in the former as a tree of considerable size, 20 to 50 ft. high, whilst in the latter it is generally a mere bush. It prefers light soils. There are numerous varieties of holly, produced, or at least perpetuated, by cultivation, exhibiting great diversity in the leaves, of which the *hedgehog holly* may be mentioned as extremely sinuous and spinous, whilst others are prized for their color, golden, silver-blotched, etc. The flowers of the holly are whitish, axillary, nearly umbellate; the fruit small, scarlet, rarely yellow or white. The abundance of the fruit adds much to the ornamental character of the tree in winter, and affords food for birds; but to man it is purgative, emetic, and diuretic, and in larger quantities poisonous. The leaves are inodorous, have a mucilaginous, bitter, and somewhat austere taste, and have been used medicinally in cases of gout and rheumatism, as a diaphoretic, and also as an astringent and tonic to correct a tendency to diarrhea, etc. The leaves and small branches, chopped, are

sometimes used for feeding sheep in severe winters. The root and bark are emollient, expectorant, and diuretic. Bird-lime (q.v.) is made from the inner bark. The wood is almost as white as ivory, very hard and fine-grained, and is used by cabinet-makers, turners, musical-instrument makers, etc., and sometimes for wood-engraving. Handles of tools and handles of metal tea-pots are very often made of it. The holly is often planted for hedges, as it bears clipping well and makes an excellent fence. A holly hedge may either be kept low or, as is the case at Tyninghame, in East Lothian, allowed to grow to the height of 20 or 30 feet. In the gardening of former days, hollies were often clipped into fantastic shapes. The name holly is said to be derived from the use of the branches and berries to decorate churches at Christmas, from which the tree was called holy-tree.—Numerous other species of holly are found in North America, most of them in swampy situations, in South America, Nepaul, Japan, and other parts of the world; some of which have now become not unfrequent ornamental trees and shrubs in Britain.—Maté (q.v.), or *Paraguay tea*, is the leaf of a South American species of holly (*I. Paraguensis*).

HOL'LYHOCK, *Althæa rosea*, a plant of the natural order *malvaceæ*, commonly referred to the same genus with the marsh mallow (q.v.). It has a tall, straight, hairy stem; heart-shaped, crenate, wrinkled, 5- to 7-angled leaves, and large axillary flowers almost without stalks; the leaves diminishing into bracts, and the upper part of the stem forming a spike; the petals hairy at the base. The hollyhock is a native of India, the south of Europe, etc., is to be seen in almost every garden in India, and has been much cultivated in gardens in Britain from a very early period. At present it is a favorite flower, and varieties, the result of cultivation, are very numerous. It varies much in the color of the flowers, and double and semi-double varieties are common. It is an autumnal flower, continuing till the frost sets in. It is a biennial or perennial plant. The stem rises to a height of 8 to 15 feet, unbranching, or nearly so. The fibers of the plant have been made into yarn, but it is not yet certain if it is really valuable for cultivation on this account, or for the manufacture of paper. It is not improbable that it might be cultivated with advantage to afford green fodder for cattle, which are very fond of its leaves, and the leaves are produced in great abundance if the plant is prevented from flowering. The flowers are mucilaginous and demulcent, and are sometimes used like those of mallows and marsh mallows. The leaves yield a fine blue dye.—The CHINESE HOLLYHOCK (*A. Chinensis*) is an allied species.

HOLLY SPRINGS, a t. in northern Mississippi, United States, on the Central railway, 25 m. s. of its junction with the Memphis and Charleston line. It is the principal town in northern Mississippi, and contains several churches, four academies, a bank, and two or three newspapers, with a large trade in cotton and merchandise. Pop. '70, 2,406.

HOLLY SYSTEM OF STEAM HEATING. See WARMING AND VENTILATION.

HOLLY WATER-WORKS. See WATER SUPPLY.

HOLMAN, JAMES, 1789–1857; b. England; at the age of 25 he became blind, nevertheless he traveled in France, Italy, and Switzerland, and published his impressions in a book which was at once popular. He then undertook a journey around the world, starting from St. Petersburg; but he was arrested on suspicion of being a spy, sent across the frontier, and returned home. Between 1827 and 1832 he made a voyage around the world, and published an account of it in 1834. In 1843–44 he made a tour of the Danubian principalities and Transylvania.

HOLMBOE, CHRISTOPHER ANDREAS, b. Norway, 1796; distinguished as a philologist; in 1822 professor in Christiania university. He published philological works in Norwegian, Danish, German, French, and Latin.

HOLMES, a co. in n.w. Florida, on the Choctawatchie river; 470 sq.m.; pop. '70, 1572—137 colored. The surface is level and the soil chiefly alluvial, producing corn, cotton, and sugar. Co. seat, Cerro Gordo.

HOLMES, a co. in w. Mississippi, on the Yazoo and Big Black rivers, crossed by the New Orleans, St. Louis, and Chicago railroad; 800 sq.m.; pop. '70, 19,370—13,225 colored. It has a level surface, with many cypress swamps and considerable forest land. Chief productions: cotton, corn, and pork. Co. seat, Lexington.

HOLMES, a co. in n.e. central Ohio, intersected by the Cleveland, Columbus, and Mount Vernon, and the Pittsburg, Fort Wayne, and Chicago railroads, and the Walhonding river; 420 sq.m.; pop. '80, 20,775. The surface is hilly and largely covered with forests; soil fertile. Chief productions: corn and pork. Co. seat, Millersburg.

HOLMES, ABIEL, D.D., LL.D., 1763–1837; b. Conn.; graduated at Yale, where he was a tutor and student of theology; in 1785 had charge of a parish in Georgia; resigned 1791 and settled in Cambridge, Mass., where he was pastor of the first parish for 40 years. His principal work was the *Annals of America*, an elaborate and careful chronology of American history. He also wrote *Life of President Styles* (whose daughter he married).

HOLMES, GEORGE FREDERICK, b. British Guiana, 1820; educated in England, in 1888 came to America and taught in an academy in Virginia, afterwards in South Caro-

lina and in Georgia. He was for a time one of the editors of the *Southern Quarterly Review*, and in 1847 was professor of history, political economy, and international law in William and Mary college. In 1846 he was president of the university of Mississippi, and in 1857 professor of history and literature in the university of Virginia. He prepared a series of text-books for the use of schools in the southern states, in which the sentiments and selections were made with reference to the justification of slavery.

HOLMES, JOHN, b. Mass., 1773; graduated at Brown university, and settled in Maine and practiced law. He was in the convention that formed the state constitution, four years a representative in congress, 12 years in the U. S. senate; afterwards in the state legislature, and lastly U. S. district-attorney.

HOLMES, OLIVER WENDELL, M.D., an American physician and author, was b. at Cambridge, Mass., Aug. 29, 1809. In 1829 he graduated at Harvard college, and entered upon the study of law, but soon adopted his father's profession—medicine. He studied in Europe, graduated as doctor of medicine in 1836, and two years after was appointed professor of anatomy and physiology in Dartmouth college; and in 1847 was transferred to the same chair at Harvard, the medical department of which is at Boston, where he has since resided. Dr. Holmes is not only a man of science, but a humorous and satirical poet of much ability. Several of his lyrics also are among the most exquisite produced in America. Most of his poems have been delivered before college literary societies, as *Poetry, a Metrical Essay; Terpsichore; Urania;* and *Astræa*. In 1857 he contributed his *Autocrat of the Breakfast Table*, a connected series of prose essays, to the *Atlantic Monthly*, which was followed by *The Professor at the Breakfast Table* and *The Poet at the Breakfast Table* (1872). A remarkable work is the singular romance, *Elsie Venner* (1861). Dr. Holmes is one of the most popular of public lecturers. Of medical writings may be mentioned *Boylston Prize Dissertations; Lectures on Homeopathy and its Kindred Delusions;* a *Report on Medical Literature*, besides articles in professional periodicals. In 1868 he published a second novel, entitled *The Guardian Angel;* and in 1870, *Mechanism in Thought and Morals.*

HOLMES, OLIVER WENDELL (*ante*). Dr. Holmes is the son of the rev. Abiel Holmes, D.D., long pastor of the First Congregational church in Cambridge and author of *American Annals.* He was born in the old "gambrel-roofed" house to which he makes frequent allusion in his works, and which is directly opposite the buildings of Harvard college, with which his relations have been intimate and almost continuous for more than fifty years. His earliest verses were written for the *Collegian*, a paper conducted by Harvard undergraduates, and many of his minor poems have been called forth by the anniversaries of the class of 1829, of which he is the most famous member, but which included Benjamin Pierce, the mathematician; justice Benjamin R. Curtis, of the supreme court; George T. Bigelow, chief-justice of Mass.; and among the living, James Freeman Clarke and William H. Channing. On leaving college he read law for a time, but subsequently devoting himself to the study of medicine, became extremely skillful both in the theory and practice of his profession. The psychological problems raised by the interdependence of mind and matter have long occupied Holmes's attention, and are scientifically discussed in his *Currents and Countercurrents in Medical Science* (1861), and in *Mechanism and Morals.* His romance *Elsie Venner* deals with the same subject from an artistic standpoint. He was one of the founders of the *Atlantic Monthly*, to whose success his productions—and in particular his best prose work, the *Autocrat of the Breakfast Table*—have largely contributed. Of his humorous verses the *One Horse Shay* and the *September Gale* are, perhaps, best known. *The Nautilus* and *Avis*, among those in a serious vein, deserve mention. Dr. Holmes is the most graceful of American writers of *vers de société*. His more labored poems are written in pentameters, but he employs successfully a variety of lyric measures. Most of his later verse has been written for special occasions. His most recent work is the *Iron Gate* (1880). Besides his contributions to medical periodicals, he has written for the *North American Review* and the *International Review.*

HOLMES, OLIVER WENDELL, JR., son of Dr. Oliver Wendell, graduated at Harvard in 1861, served in the federal army during the rebellion, read law, and is a member of the Boston bar. He has published the 12th edition of Kent's *Commentaries*, revised to conform to the present state of the law, and with full and learned annotations. Holmes has been editor of the *American Law Review*, for which he wrote a series of articles on the growth of legal conceptions.

HOLM OAK, or HOLLY OAK, the ilex of the Romans; an evergreen of s. Europe and n. Africa noted for beauty and the exceeding durability of its timber.

HOLOCAN'THUS, a genus of fishes of the family *chætodontidæ* (q.v.), remarkable for the great beauty and symmetry of their colors, and for their excellence as articles of food. They have the very compressed form and other general characters of the *chætodontidæ*, a single dorsal fin, and a large spine on the gill-cover. They are natives of the seas of warm climates. *H. imperator* is one of the most esteemed fishes of the East Indies, rivaling the salmon in flavor. Its greatest size is about 15 in. long; its color is deep blue, with numerous narrow bands of orange, the pectoral fins black, the tail bright yellow. It is known in some parts of the east as the *emperor of Japan.*

HOLOCAUST. See SACRIFICE.

HOLOFERNES. See JUDITH.

HOLOGRAPH (Gr. *holos*, all, and *graphe*, writing), deed or writing, in Scotch law, means a writing in which the author or maker does his own penmanship. Considerable privileges are given to this species of writing, whereas in England and Ireland it is in general utterly immaterial whose penmanship is used, provided the party sign or seal the writing or deed. In Scotland, if a person execute his will or a deed in holograph, this dispenses with the usual formalities which would be requisite if he merely signed a paper written by another hand, for no witnesses are required to attest holograph deeds or testaments. If the handwriting, however, is disputed, evidence must be given as to whose handwriting it is. In England it is quite immaterial whether a person writes out his own will or not; in either case there must be two witnesses. So in the case of holograph missive writings and accounts, there is a difference as to the period of prescription applicable in Scotland, but in England there is no distinction merely on this ground. The distinction between holograph and other deeds also prevails in the law of France and other continental countries.

HOLOPTY'CHIUS (*holos*, all, and *ptychè*, wrinkle), a remarkable genus of fossil ganoid fishes, so named from the wrinkled appearance of the enameled scales. They were of large size, some species probably reaching the length of 12 feet. The small head was covered with large tuberculated plates, like those of the crocodile, and the body was completely encased in large scales, more like those of a reptile than a fish. Some scales have been found measuring 3 in. in length by 2¼ in breadth, and a full eighth of an inch in thickness. They were composed internally of porous bone, in numerous layers, arranged alternately at right angles to each other, and the outside was covered with a bright glossy corrugated enamel. The spines of the fins were large and hollow; the bones were partially ossified; the center remained in its original cartilaginous condition, and consequently appears hollow in the fossil. The jaws were covered with hard enamel instead of skin, and were furnished with a double row of teeth; the outer row, placed along the edge of the mouth, were small and thickly set; the inner range were widely set, and very large, at least twenty times the bulk of the others. A specimen was obtained at Clashbennie, on the firth of Tay, by Mr. Noble; it now forms part of the British museum collection. It is a foot across by 2½ ft. long without the tail, which is wanting. It is nearly perfect, lying on its back, with the scales and the ventral fins in their original position.

The genus is peculiar to the old red sandstone and carboniferous measures; eight species being found in the former, and nine in the latter. The name holoptychius is now generally confined to the fossils of the old red sandstone, and that of rhizodus, which Owen applied to the teeth remains before their connection with the fish was known, has been given to the holoptychians of the coal measures, which have the outer row of teeth more robust and obtuse, and the inner set longer, sharper, and more slender than in the older species.

HOLOTHU'RIA, a genus of *echinodermata* (q.v.), the former limits of which are now those of a family, *holothuridæ*, divided into numerous genera. SEA-SLUG and SEA-CUCUMBER are popular names of some of the animals of this family. The *holothuridæ* have not the covering of calcareous plates characteristic of the more typical *echinodermata*, but a soft leathery muscular integument, very irritable, and capable of great distention and contraction. Some of them are almost globose, some so much elongated as to be almost worm-like; but the same individual is often capable of extending itself to several times the length which it has in a state of repose. In locomotion, the body is extended and contracted as by the annelides, but the principal organs of locomotion, as in star-fishes and sea-urchins, are suckers or *ambulacra* (q.v.), of which there are usually five double rows, whilst sometimes they are distributed over the whole surface of the body; but some of the species have the suckers developed only on a disk, and the body then presents an upper and an under surface. The radiate structure is most apparent in the mouth, which is surrounded with tentacles, in number always a multiple of five, exhibiting great variety of beautiful forms, and capable of being completely retracted. Little is known of the food of the *holothuridæ*, which, however, probably consists of small marine animals. Within the opening of the mouth there is a circle of teeth. There is no proper stomach. The intestine is often very complicated. The respiratory organs are near the anus, and consist of branching tubes. The organs of both sexes are found in each individual. The young pass through several stages or transformations, in which they are very unlike their parents; in their first stage, after leaving the egg, they swim vigorously by means of membranous expansions of the body. The *holothuridæ* are capable of the most extraordinary reproduction of parts, even of the most important organs. They are found in all seas, but particularly abound in the Red sea, and between the s. of Asia and Australia. The largest European species, *H. (cucumaria) frondosa*, occasionally found in the British seas, is about a foot in length, and capable of extending itself to 3 feet. Most of the British species are small, and they are not of a pleasing appearance as they usually come under observation, although the expanded tentacles give them beauty in their proper abodes. But many of the tropical species

exhibit splendid colors, and are among the creatures which make the bottom of the sea, particularly among coral reefs and islands, gay and lovely as a garden.

The *bêche-de-mer* (q.v.), or trepang, so much esteemed as a delicacy by the Chinese, belongs to this family.

HOLSTEIN, formerly a duchy belonging to Denmark, and at the same time a member of the Germanic confederation, was annexed in 1866 to Prussia. It is separated from Sleswick on the n. by the river Eyder and the Sleswick-Holstein canal; is bounded on the e. by the Baltic sea, the territory of Lübec, and the duchy of Lauenburg; on the s. by the Hamburg territory and the river Elbe, which separates it from Hanover; and on the w. by the North sea. Area, 3,270 sq.m.; pop. 554,510. The principal rivers, besides the Elbe and the Eyder, are the Stör and the Trave. Of the surface of the land, one-eighth consists of marshes. The central districts of the province are occupied by an undulating plain, varied by low hills, and traversed from n. to s. by a heathy and sandy ridge, from which the land falls away gradually on the e.—where the surface is varied by lakes and fertile well-wooded valleys—and on the west. The soil, with the exception of several tracts of sand and heath, is very fruitful, and is most luxuriant in the marshes. The climate and natural productions closely resemble those of similar districts in the n. of Germany. Salt and lime are the only minerals found. Amber is obtained on the eastern coast, and the interior abounds in peat. The manufactures of Holstein are inconsiderable; agriculture and the rearing of cattle are the chief employments of the people. The history of Holstein and its political relations are noticed in the article SLESWICK.

HOLSTERS, cases for pistols affixed to the pommel of a saddle. They are frequently covered with wool or fur, to prevent injury to the rider in the event of his being thrown forward upon them.

HOLSTON, a river and branch of the Tennessee, rising in Virginia and running s.w. through a fertile valley at the base of Cumberland mountains, joining the Clinch river in Roane county. Its extreme length is about 350 miles. Steamboats of light draught come up as far as Knoxville.

HOLT, a co. in n.w. Missouri bordering on Kansas and Nebraska, between the Missouri and Nodaway rivers; crossed by the Kansas City, St. Joseph and Council Bluffs railroad; 470 sq.m.; pop. '80, 15,510—225 colored. The surface is undulating and there are high bluffs along the Missouri river. The soil is good; chief productions: wheat, oats, corn, and butter. Co. seat, Oregon.

HOLT, a co. in n. Nebraska on the Dakotah border, s. of Niobrara river, and drained in part by the Elkhorn; 2,100 sq.m.; pop. '80, 3,287. Co. seat, O'Neill City.

HOLT, Sir JOHN, 1642–1709; b. England; lord chief-justice of the court of the king's bench in the reign of William. His father, sir Thomas Holt, had been sergeant-at-law, and his eldest son, John, followed the profession of law. After having been entered at Oriel college, Oxford, as a gentleman commoner, he became a member of Gray's inn in 1658. He soon displayed a decided predilection for the study of law, became an able advocate, and well versed in the constitutional law of England. He was made recorder of London in 1685, which office he held for a year and a half, when he became unpopular at court. It had been determined to abolish the test act; but the measure was opposed by Holt, and in consequence he had to retire from the office of recorder. Subsequently, in 1686, he was made sergeant-at-law. The ability which he displayed in the convention parliament raised him so high in the estimation of the prince of Orange, that, upon the accession of the latter to the English throne, Holt was made lord chief-justice of the king's bench. Upon the removal of Somers in 1700 from the chancellorship, William was desirous that Holt should accept the great seal, but he declined.

HOLT, JOSEPH, b. Ky., 1807; received a collegiate education, and in 1832 began the practice of law in Louisville. In 1857 he was commissioner of patents, and in 1859 postmaster general. When Floyd, secretary of war, went over to the rebellion in Dec., 1860, Holt assumed charge of the department. In 1862 he was made judge advocate general of the army.

HÖLTY, LUDWIG HEINRICH CHRISTOPH, 1748–76; b. at Mariensee, near Hanover. He studied theology at the university of Göttingen, and became a member of the society of poets formed by Bürger, Müller, and count C. Stolberg. He had a very delicate constitution, and died at the early age of 28, while preparing a collection of his poems. They were published in 1783 by his friends Stolberg and Voss, and became very popular.

HOLTZENDORFF, FRANZ VON, b. Prussia, 1829; studied law at Heidelberg and Bonn, was professor in Berlin, and in 1867 was chosen a member of the North German parliament. He has published a number of works on legal and political subjects.

HOLY ALLIANCE, a league formed after the fall of Napoleon by the sovereigns of Russia, Austria, and Prussia, nominally to regulate the relations of the states of Christendom by the principles of Christian charity, but really to preserve the power and influence of the existing dynasties. Most of the other European rulers acceded to it,

and the treaty was formally made public in the *Frankfort Journal*, Feb. 2, 1816. It was in virtue of this league that Austria, in 1821, crushed the revolutions in Naples and Piedmont, and that France, in 1823, restored absolutism in Spain. Subsequently, both France and England seceded, after which it became a mere *nominis umbra*. A special article of the treaty excluded forever the members of the Bonaparte family from any European throne!

HOLY COAT, a relic preserved with the greatest reverence in the cathedral of Treves, of which city it is esteemed the greatest treasure. It is alleged to be the seamless coat of our Savior, and to have been discovered in the 4th c. by the empress Helena, in her memorable visit to Palestine, and by her deposited at Treves. The Treves relics were concealed from the Normans in the 9th c. in crypts; but the holy coat was rediscovered in 1196, and then solemnly exhibited to the public gaze, which did not take place again till 1512, when multitudes flocking to see and venerate it, Leo X. appointed it to be exhibited every seven years. The reformation and wars prevented the regular observance of this great religious festival; but it was celebrated in 1810, and was attended by a concourse of no fewer the 227,000 persons; and in 1844 by still greater multitudes, whilst miraculous cures were confidently asserted to be performed by the precious relic. The exhibition of the holy coat in 1844 is otherwise memorable for the reaction which it produced, leading to the secession of Rongé and the German Catholics from the church of Rome.—For further information see *The Book of Days*, published by W. & R. Chambers.

HOLY COMMUNION, Sisters of the, founded in New York in 1845 by ladies of the Protestant Episcopal church, mainly through the influence of rev. W. A. Muhlenberg. Their duties are the care of the sick. They take no vows, nor have they any fixed style of dress.

HOLY CROSS, Congregation of the, founded in 1834 in France, and in 1842 in the United States, where they have many establishments, including a college at Watertown, Wis. In Europe they are called cross-bearers or croisiers.

HOLY FAMILY, the name given, in the language of art, to every representation of the infant Savior and his attendants. In the early part of the middle ages, when the object in view was to excite devotion, the Virgin and child were usually the only persons represented. At a later period, Joseph, Elizabeth, St. Anna (the mother of the Virgin), and John the Baptist, were included. Some of the old German painters have added the twelve apostles as children and playfellows of the infant Christ, as well as their mothers, as stated in the legends. The Italian school, with its fine feeling for composition, was the first to recognize of how many figures the group must consist, if the interest is to remain undivided, and be concentrated on one figure, whether that figure be the Madonna or the child. Two masters are pre-eminent in this species of representation—Leonardo da Vinci and Raphael.

HOLY FIRE, in the church of Rome, a light kindled at Easter, by sparks struck from a flint, in remembrance—according to the missal—of Christ as the great corner-stone, and hailed by kneeling ecclesiastics with the words "Light of Christ" (*Lumen Christi*). The ceremony takes place on Holy Saturday, of which day's service it forms a striking part; and at Rome it takes place in the presence of the pope himself; all the lights in the chapel having been previously extinguished, to be rekindled at the new fire.—The kindling of the holy fire in the church of the Holy Sepulcher at Jerusalem, at the Easter of the oriental church, is represented as miraculous. The Greek and Armenian clergy combine on this occasion, and amidst processions, solemnities, an excited multitude, and scenes disgraceful not only to the name of religion but to human nature, the expected fire makes its appearance from within an apartment in which a Greek and an Armenian bishop have locked themselves.

HOLY GHOST, or Holy Spirit, in orthodox theology, the third person of the Trinity (q.v.), proceeding from the Father and the Son, yet of one substance, majesty, and glory with the Father and the Son, very and eternal God. His distinct personality is believed to be attested by a multitude of passages in Scripture, which it is unnecessary to quote. One may suffice: "But when the Comforter is come, whom I will send unto you from the Father, even the Spirit of truth, which proceedeth from the Father, he shall testify of me" (John xv. 26). The "procession" (q.v.) of the Spirit is the subject of one of the chief differences between the eastern and the western or Latin churches. He is essentially a spirit of holiness, and his grand function is to apply to the hearts of men the benefits of Christ's death, to work in them, first, a belief of the truth as it is in Jesus, and then to sanctify them by that truth.

HOLY GRASS, *Hierochloe borealis*, a grass about a foot high, with a brownish glossy lax panicle. It is found in the most northern parts of Britain, and in the n. of Europe. It has a sweet smell, like that of vernal grass; and in Iceland, where it is plentiful, it is used for scenting apartments and clothes. In some countries it is strewed on the floors of places of worship on festival-days, whence its name.

HO'LYHEAD, a seaport, parliamentary borough, and market town of North Wales, in the county of Anglesea, is situated on a small island of the same name, 24½ m. w.n.w. of Bangor, and 272 m. n.w. of London. Although recently much improved, it is still

a primitive, irregularly built town. It is the station of the mail steam-packets to Dublin, from which it is distant about 69 miles. The harbor of Holyhead, which is almost dry at low tide, is formed by a pier about 1000 ft. in length, running n.e. from an islet called Salt island, which is connected with the mainland by a swivel-bridge. Few manufactures are carried on here. Pop. '71, 5,916, who are employed in the coasting-trade, and in ship-building and rope-making. The fine harbor of refuge incloses an area of about 400 acres, and is protected by a breakwater 7,860 ft in length; seven million tons of stone were used in this work. Holyhead unites with Amlwch, Beaumaris, and Llangefni in sending a member to the house of commons.

HOLYHEAD ISLAND, a small island of North Wales, lies w. of the island of Anglesea, and forms part of the county of that name. Its greatest length is 7½ m., and its greatest breadth about 3½ miles. Area, about 6,000 sq. acres; pop. '71, 8,595. Holyhead island is separated from Anglesea by a narrow sandy strait crossed by the Holyhead road and the Chester and Holyhead railway, which are formed by embankments or causeways, arched in the center, to admit of the passage of the water. The island, which comprises some good pasture-grounds for sheep, as well as a proportion of arable land, is for the most part rocky and barren. On the n.w. coast are two islets, the North and South Stacks, the latter with a light-house, the light of which is visible at 20 m. distance. The South Stack is connected with the island of Holyhead by a suspension-bridge. The Stacks and the north coast of the island of Holyhead are hollowed out by the action of the sea into magnificent caves, which are the haunt of innumerable sea-fowl. Principal town, Holyhead (q.v.).

HOLY ISLAND, or LINDISFARNE, a small island of England, belonging to the county of Northumberland, and situated about 10 m. s.e. of Berwick-on-Tweed. It is about 4 m. long and 2 m. broad, and is connected with the mainland by sands 3 m. in extent, which can be traversed at low-water by vehicles of all kinds. Pop. of parish, 1871, 876; but, including the chapelries of Kyloe and Ancroft (which are both in the ancient parish), and called *Islandshire*, 3,764. On the s. coast is the village of Holy Island, finely situated, and now much resorted to by summer visitors. On the island are several ruins, the chief of which are the extensive and somber-looking remains of the famous abbey of Lindisfarne, originally a Saxon edifice; there is also an ancient castle, now fortified and occupied by a party of artillery. In former times, Holy Island was the seat of a bishopric.

HOLY LAND. See PALESTINE.

HOLY LEAGUES, the name given to certain political alliances in Europe; the principal are as follows: 1. In 1511, between the pope, Spain, and Venice, the object being to expel the French from Italy. 2. In 1538, between Charles V. and the Roman Catholic princes of Germany in opposition to the league of Schmalkend. 3. In 1571, the pope, Spain, and Venice against the Turks. 4. Of the Guise family, the pope, Spain, and the French parliament against the Huguenots. 5. In 1609, between the pope and the Roman Catholic states of Swabia and Bavaria. 6. In 1684, of Poland, Germany, and Venice against the Turks.

HOLY MAID OF KENT. See BARTON, ELIZABETH, *ante*.

HOLYOAKE, GEORGE JACOB, b. England, 1817; he was a student and teacher of mathematics in Birmingham, and while still young became noted as an advocate of extreme radicalism. He has taken great interest in the theory and practice of co-operation, and has published a *History of Co-operation in Rochdale*, where the pioneer association was established in 1844. He has for several years been the editor of *The Reasoner*, an organ of secular liberalism, or a system of civilization based upon secular and not upon theological ideas. He is a strong advocate of the utmost freedom of thought, opinion, and of action, with due regard to the rights of others. In the autumn of 1879 he visited the United States, and spoke in New York and other places on co-operation.

HOLYOKE, a city of Hampden co., Mass., on the w. bank of the Connecticut river, on the New Haven and Northampton and the Connecticut river railroads; 80 m. s.w. of Boston; pop. of town, '75, 16,260. Holyoke is a rapidly growing manufacturing city, at the South Hadley falls, the greatest water power in New England, within a mile and a half of the city, is a dam 30 ft. high and 1000 long, throwing the water into a canal 3 m. in length, which can furnish power enough to drive a million spindles. Paper is the leading article of manufacture, and there are 15 or 20 mills, employing more than 2,000 persons. About as many persons are engaged in cotton factories. The city has broad and pleasant streets, nine churches, and a fine city hall of rough split granite. One of the objects of interest is a costly monument to the soldiers who fell in the war of the rebellion.

HOLYOKE, EDWARD AUGUSTUS, LL.D., 1728–1829; b. Mass.; a physician who lived beyond the advanced age of 100 years, retaining all his faculties to the last. He graduated at Harvard college, of which his father was president, and began the practice of medicine in Salem, Mass., in 1749, and continued actively in his profession for 79 years. He was twice married, and had 12 children, of whom only two survived him. He attributed his longevity to his careful attention to the laws of health, and especially to regular sleep. At the age of 80 he had lost some teeth, was slightly deaf, and used

convex glasses in reading, but as he grew older his sight strengthened, and in his 101st year he could read the smallest print without the aid of spectacles. He was present at a dinner given in honor of his 100th birthday, and responded to the congratulations of the guests in suitable words.

HOLYOKE, MOUNT, 3 m. s.e. of Northampton, Mass., is a ridge of greenstone some 1120 ft. above the sea level, very frequently visited by tourists. A carriage road winds upwards to the summit, but since the opening of the mountain railway, passengers generally prefer that method of ascent, being drawn up in small cars by a stationary engine. In 1821 a hotel was opened on the summit, from which a magnificent view is obtained. The carriage road is nearly 4 m. in length, and the ascent by rail is almost precipitous, in one instance rising 365 ft. in perpendicular height by an incline 600 ft. long. In the first 12 years after its opening 125,000 persons availed themselves of the railroad. The view from this summit has long been famous as one of the finest in New England, not for its extent or grandeur, but for a quiet loveliness due to the windings of the Connecticut river amid charming meadows and near and distant hills, while the broad and fertile valley, highly cultured and dotted with villages, gives the scene a domestic interest. The prospect, however, has a wide range in some directions.

HOLY PHIAL, or SAINTE AMPOULE, ORDER OF, the name of an order of knighthood which formerly existed in France, and was composed of four persons, usually the first in point of rank, family, and fortune in the province of Champagne, and styled *Barons de la Sainte Ampoule.* At the coronation of the French kings, they were delivered to the dean, priors, and chapter of Rheims, as hostages for the fulfillment of the engagements entered into by the great officers of the crown to return the holy phial in which the coronation oil was kept, and which, according to the legend, was brought from heaven by the Holy Ghost under the form of a dove, and put into the hands of St. Remy at the coronation of Clovis—an enormous crowd having prevented the messenger from bringing in time that which had already been prepared. The peculiarity of this order was that the knights were only knights for a day. Their badge was a cross of gold enameled white, cantoned with four fleur-de-lis, and on the cross a dove descending with a phial in its beak, and a right hand receiving it.

HOLY PLACES—HOLY SEPULCHER. Under the head Jerusalem (q.v.) are enumerated many localities which, from the memories associated with them, must be full of solemn interest for every religious mind; but the name holy places of Jerusalem more strictly designates the group of sacred places of which the church of the Holy Sepulcher is the center, and which are supposed to comprise the sites of the chief events of our Lord's passion, death, and burial: Gethsemane, the supper-room, the church of the Ascension, the tomb of the virgin, etc.

In the article JERUSALEM, the general topography of the ancient and modern city is briefly described. The so-called church of the Holy Sepulcher stands within the modern city, on the n.w. or Latin quarter. It is a Byzantine building, in the center of a spacious inclosed court. Under the great dome of the church stands the holy sepulcher, which is of an oblong form, 15 ft. by 10, and is surmounted by a rich ceiling, decorated with gold, silver, and precious marble. A circular hall surrounds the space beneath the dome. Around this circular hall are oratories for the Syrians, Copts, and Maronites; and above it is a series of galleries, which are similarly appropriated. In the body of the church are the chapels of the Greek, Latin, and Armenian Christians, the church as a whole being maintained by the Ottoman authorities in the condition, as it were, of a common meeting-ground for all the Christian communions, as the rivalries of the several religious bodies constantly lead to angry controversy, and not unfrequently to sanguinary conflicts. Opposite the entrance of the inclosure is a somewhat elevated marble slab, which is called the stone of unction, and is shown as the stone on which our Lord's body was anointed before entombment; and above is an elevation approached by steps, which is the traditionary Mt. Calvary, and on which now stands a rich dome-shaped building, floored with rich marbles, in the crypt of which is the cavity supposed to have been formed by the erection of the cross. The street by which this site is approached, from the direction of the ruins of Herod's palace, on the n. side of the city, is the principal street of the Latin quarter, and is called by the Turks *Harât-el-Albam,* and by the Christians the *Via Dolorosa,* as being the supposed route of our Lord from the hall of judgment to Calvary.

Such is the traditional view as to the locality, not only of these leading events of our Lord's history, but also of many others of minor importance, and less prominently noticeable. For a long course of ages, the Christian world unhesitatingly acquiesced in this view of the topography of the holy places; but since the beginning of last century, doubts have been entertained as to its correctness; and in late years the question has been discussed with much learning, although with little positive, or at least conclusive, result. About the year 1730, a German, named Korte, who had visited Jerusalem, and explored the locality, published a work, calling the authenticity of the received system of sacred topography into question. The doubts expressed by him have been repeated at intervals ever since his day, and especially by the celebrated American critic, Dr. Robinson, author of *Biblical Researches in Palestine,* who may be said in two successive investigations to have exhausted the evidence on one side of the question, at least so

far as the remains of the ancient city had at that time been explored. Dr. Robinson distinctly affirms the impossibility of reconciling the received sacred localities with the plain requirements of the gospel history; but he fails himself to point out a scheme of topography which may be substituted for that which has been traditionally received. More recent critics, and especially Mr. James Ferguson, in an *Essay on the Ancient Topography of Jerusalem*, agreeing with Dr. Robinson in rejecting the received topography, contends against him that the true site of the holy sepulcher can be accurately determined, and that it is no other than the mosque of Omar, or, as the Mohammedans call it, the "dome of the rock." This he holds to be the identical church which Constantine erected over the rock which contained the tomb of our Lord. Dr. Stanley, a late biblical traveler in Palestine, left the question undecided. We can here do nothing more than refer the reader to the chief authorities on each side of the controversy. See, on the one side, Robinson's *Biblical Researches in Palestine;* Smith's *Dictionary of the Bible*, article "Jerusalem" (Ferguson); *Essay on the Ancient Topography of Jerusalem*, by the same author. On the other, Williams's *Holy City;* Raumer's *Beiträge zur Bibl. Geographie;* Sepp's *Forschungen eines Deutschen Reisenden in Jerusalem;* Schaffter's *Aechte Lage des heiligen Grabes.* Under the auspices of the Palestine exploration fund, diligent researches are now being carried on at Jerusalem, and several important discoveries have been made. See an account of the excavations in *Underground Jerusalem*, by capt. Warren, R.E. (London, 1876).

HOLYROOD. In the year 1128, king David I. of Scotland founded at Edinburgh an abbey of canons regular, of the order of St. Augustine. It was dedicated in honor of the holy cross or rood, which was brought to Scotland by St. Margaret about the year 1070, and became one of the heirlooms of the kingdom. The black rood of Scotland (q.v.), as it was called, fell into the hands of the English at the battle of Neville's Cross in 1346, and as its history passed from remembrance, a fable sprung up telling how king David was prevailed upon by his young nobles to go a hunting on the solemn festival by which the church yearly commemorated the finding of the holy cross at Jerusalem; how the chase lay through the forest, which in those days encircled Arthur's Seat, and stretched almost to the gates of Edinburgh; how the king, in pursuit of a wild hart, outrode all his companions; how at the foot of Salisbury crags the hart turned to bay, and overthrew the king's horse; how as it rushed at the king, threatening him with instant death, a cross, as if from between its antlers, miraculously slid into the king's hands; how at the sight of it the hart fled and vanished; and how the king, warned by a vision in his sleep, resolved to build a monastery in honor of the holy rood on the spot where his life had been so preternaturally saved. When this legend was invented, apparently about the year 1420, it had been forgotten that the first site of the abbey was not at the foot of Salisbury crags, but within the walls of the castle, whence it was not finally removed until after the year 1174, to the eastern extremity of the Canongate, as the little burgh came to be called which the canons erected between their abbey and the king's burgh of Edinburgh. The abbey was burned by the English in 1385, in 1544, and in 1547. Before it could be restored after these last conflagrations, the reformation arrived, when the ruins of the choir and transepts were taken down to repair the nave. This was used as the parish church of the Canongate from about 1560 till 1672, when it was turned into the chapel-royal. In 1687 king James VII., having built another parish church for the Canongate, set the nave of the abbey church apart for the Roman Catholic service, and had it fitted up with stalls for the knights of the thistle. It was plundered and burned by the mob at the revolution in 1688, and remained in neglect until 1758. In that year it was repaired and roofed, but the roof was too heavy for the walls, and it fell in 1768, crushing the pillars of the n. aisle, and otherwise injuring the building.

The abbey of Holyrood early became the occasional abode of the Scottish kings. John Baliiol held a parliament within its walls in 1295. James II. was born in it, crowned in it, married in it, buried in it. The foundations of a palace, apart from the abbey, were laid by James IV., whose splendid nuptials with the princess Margaret of England were celebrated here in 1503. Edinburgh had now become the acknowledged capital of Scotland, and Holyrood henceforth was the chief seat of the Scottish sovereigns. Queen Mary took up her abode in the palace when she returned from France in 1561. Here, in 1566, Rizzio was torn from her side, and murdered. Her son, king James VI., dwelt much in Holyrood before his accession to the throne of England in 1603. He revisited it in 1617. It was garrisoned by Cromwell's troops after the battle of Dunbar in 1650, when the greater part of it was burned down. It was rebuilt by king Charles II., from the designs of sir William Bruce of Kinross, between 1671 and 1679. In 1745 and 1746 it was occupied in succession by prince Charles Edward and by the duke of Cumberland. It sheltered the count d'Artois (afterwards king Charles X. of France) from 1795 to 1799, and again from 1831 to 1835. King George IV. held his court in it in 1822. Since that time much has been done to make it a suitable residence for the sovereign, and queen Victoria has occasionally made a short stay here.

The oldest part of the palace is the n.w. tower, founded by king James IV. about 1500, and completed by his son, king James V., who died in 1542. It was somewhat

modernized in 1671–79; and the roofs, if not the floors also, were renewed by king Charles I. (1625–49), whose cipher they bear; but otherwise the disposition of the rooms seems to be much the same as in the days of queen Mary. It need scarcely be added that the furniture is much more recent, and that the articles shown as relics of Mary and her court are wholly spurious.

The palace, with its precincts and park, is a sanctuary for debtors. In England the same privilege extends to royal palaces to this extent, that no writ of legal process can be executed within their bounds; but this practically is only a protection to the servants of the palace; and no means exist for insolvent persons taking lodgings in a privileged place there or elsewhere, and avoiding imprisonment, in so systematic a way as is competent to residents within the precincts of Holyrood palace, where there is ample accommodation. The precincts comprehend the adjoining park and the hills of Arthur's Seat and Salisbury crags. Refugee debtors must procure a certificate of protection within 24 hours from the proper official within the bounds. Taking refuge within the sanctuary is considered disreputable, and from this cause, as well as from recent meliorations in the laws affecting debtors, the practice is greatly fallen off. It is to be added that the sanctuary of Holyrood shelters debtors to the crown.

HOLY SEPULCHER, KNIGHTS OF THE, an order of knighthood instituted, probably by pope Alexander VI., for the guardianship of the holy sepulcher, and the relief and protection of pilgrims. The pope was originally the grand-master, but he subsequently ceded his rights to the guardian father of the holy sepulcher. The knights must, by the rules of the order, be all of noble descent; they were bound to hear mass daily, to fight, to live, and to die for the Christian faith, etc. In return for these duties, the knights had the most unusual and extraordinary privileges conferred on them: they were exempt from taxation, could marry, and yet possess church property, legitimize bastards, and cut down and bury the bodies of criminals who had been hanged. On the recapture of Jerusalem by the Turks, the knights retired to Italy, and settled at Perugia. After a temporary union with the hospitalers, the order was reconstructed in 1814 both in France and in Poland, and is still in existence within a very small circle of knights elected by the guardian father from the most respectable pilgrims who come to Jerusalem.

HOLY SPIRIT PLANT, or DOVE PLANT, names given to a Central American orchid, the *peristeria elata*. The flower stem is 5 or 6 ft. high, bearing upon its upper portion numerous tulip-shaped, fragrant white flowers. The stamens and pistils in the orchid family are united in a column, and in this particular plant they present the appearance of a dove with expanded wings within a spherical alabaster white vase formed by the petals. It is used in religious festivals in Central America as the symbol of the form in which the Holy Spirit descended at the baptism of our Lord.

HOLY WATER, in the Roman Catholic, as also in the Greek, Russian, and oriental churches, signifies water blessed by a priest or bishop for certain religious uses. Water is, almost of its own nature, a fitting symbol of purity; and accordingly, in most of the ancient religions, the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the personal acts of sanctification prescribed to individuals. The Jewish law contained many provisions to the same effect; and our Lord, by establishing baptism with water as the necessary form of initiation into the religion instituted by him, gave his sanction to the use, which, from its universal acceptance among mankind, appears to be a relic of the primeval natural revelation. The usage of sprinkling the hands and face with water before entering the sanctuary, which was prescribed in the Jewish law, was retained, or at least very early adopted, in the Christian church. It is expressly mentioned by Tertullian in the end of the 2d century. And that the water so employed was blessed by the priests we learn, among others, from St. Jerome, and from the apostolical constitutions. Although it is difficult to fix the precise time, it cannot be doubted that the practice of mingling salt with the water is of very ancient origin (see Canon 20, *De Consecr. Dist.* iii.). In the western church there is a solemn blessing of water in the service of Holy Saturday, but the ceremonial is repeated by the priest whenever it may be necessary to replenish the fountain. Instructed Catholics regard the use of holy water chiefly as a means of suggesting to the mind the necessity of internal purity; and although it is supposed to derive from the blessing a special efficacy for this end, yet this efficacy is held to be mainly subjective and of a character entirely distinct from that ascribed to the sacramental rites of the church. In the reformed churches the use of holy water is regarded as unscriptural and superstitious.

HOLY WEEK, the week immediately preceding Easter, and specially consecrated to the commemoration of the passion of our Redeemer. In English use, it is also called "passion week" (a name appropriated, in Roman use, to the week before Palm Sunday). This institution is of very early origin, and the name holy week is but one of many by which its sacred character has been described. It was also called the "great week," the "silent week," the "week of the holy passion," the "vacant week," the "penitential week." In the Roman Catholic church, the special characteristics of the celebration of the holy week are increased solemnity and gloom, penitential rigor, and mourning. If any of the ordinary church festivals fall therein, it is transferred till

after Easter. All instrumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and statues are veiled from public sight; manual labor, although it is no longer entirely prohibited, is by many persons voluntarily suspended; the rigor of fasting is redoubled, and alms-deeds and other works of mercy sedulously enjoined and practiced. All church services of the week, moreover, breathe the spirit of mourning, some of them being specially devoted to the commemoration of particular scenes in the passion of our Lord. The days thus specially solemnized are Palm Sunday, Spy Wednesday, Holy (or Maundy) Thursday, Good Friday (q.v.), Holy Saturday. Holy Thursday (called also Maundy Thursday, from *mandatum*, the first word in one of the church services of the day), in the Roman Catholic church, is specially designed as a commemoration of the Last Supper, and of the institution of the Eucharist. But there are several other services annexed to the day, as the solemn consecration of the oil or chrism used in baptism, confirmation, orders, and extreme unction, the washing of pilgrims' feet, and the tenebræ. To Holy Saturday belongs the solemn blessing of fire and of the water of the baptismal font; and from the earliest times it was set apart for the baptism of catechumens, and for the ordination of candidates for the ecclesiastical ministry. From the fire solemnly blessed on this day is lighted the Paschal light, which is regarded as a symbol of Christ risen from the dead. This symbolical light is kept burning during the reading of the gospel at mass throughout the interval between Easter and Pentecost. See Wetser's *Kirchen-Lexicon*, art. "Charwoche." It must be added, however, that in many instances the primitive institution of the holy week was perverted, and that the suspension of labor, which was originally designed for purposes of devotion and recollection, was turned into an occasion of amusement not unfrequently of a very questionable character. Such abuses are now universally discountenanced by the ecclesiastical authorities.

In the Protestant communions there is no special solemnization of the holy week, with the exception of Good Friday (q.v.), which is observed in some of them.

HO'LYWELL, a municipal and parliamentary borough, and market t. of North Wales. in the co. of Flint, and 4½ m. n.w. of the town of that name, is situated on an eminence on the line of the Holyhead and Chester railway, and near the south-western shore of the estuary of the Dee. It is the center of an immensely valuable mineral district, and is the seat of numerous establishments for lead and copper smelting, manufacturing shot, zinc, etc. There are also manufactures of cottons, flannels, and galloons, paper, and Roman cement; coal and lead mines, and limestone quarries, are worked. This borough unites with those of Flint, Mold, etc., in returning a member to parliament. Pop. '71, 7,961.

Holywell is now one of the most important and flourishing towns of North Wales. It owes its origin to the renowned well of St. Winifred, which is estimated to deliver twenty-one tons of water per minute, and is said to be the most copious spring in Britain. Its waters were at one time believed to be efficacious in curing diseases, and were visited by great numbers of pilgrims.

HOMAGE is the service or show of respect due from a knight or vassal to his lord in feudal times. The word is derived from the form of expression used in doing the service, which was—*jeo deveigne vostre home*—I become your man. Since the abolition of tenures, the word has no substantial legal meaning in the law of England, except in a limited sense as to copyholds, to denote the kind of acknowledgment made by a tenant to the lord of the manor. The homage jury consisted of the tenants who did homage, and their presence was necessary to attest some acts. *Homagium reddere* was the expression, now obsolete, signifying a solemn renunciation of homage or fealty to the lord, and a defiance of him. The word homage is not used in Scotch law, though the feudal system is not obsolete in Scotland in many other respects.

HOMALOP'SID-Æ, a family of serpents distinguished by having flat, plate-like spaces on their heads and on the abdomen. The family comprises a number of genera, five or six of which are found in North America.

HOMALOP'TERA (Gr. level-winged), the name given by some entomologists to a small order of insects, which has been more generally regarded as a division of the order *diptera*. The homaloptera have also been called PUPIPARA, from the remarkable circumstance that the larvæ are hatched within the body of the mother, and remain there till they have passed into the pupa state. Some of the homaloptera are wingless. Examples of this order are found in the forest fly (q.v.), and in those extraordinary parasites of bats called *nycteribia*. All the homaloptera are parasites.

HOM'BURG VOR DER HÖHE, a pleasant little t. in the province of Hesse-Nassau, Germany, is situated at the foot of the Taunus mountains, 9 m. n.w. of Frankfort-on-the-Main. It has beautiful environs, and is much frequented on account of its mineral waters and, until recently, gambling saloons. The waters are considered very effective in cases of disordered liver and stomach. They are five in number, and one of them, the *Elizabeth*, contains more carbonic acid than any saline spa known. About 400,000 bottles of the "waters" of Homburg vor der Höhe are annually sent away. Pop. '71, 8,626; '75, 8,294.

HOME, DANIEL DUNGLAS, b. Scotland, 1833; especially noted as a spiritualist. When a child he came to the United States, and at 17 years of age was extensively known as a medium, and the most surprising stories were told of his powers and his manifestations. In 1833 he began the study of medicine, but soon gave it up and visited Europe. While in Rome he joined the Roman Catholic church. At St. Petersburg in 1858 he married a Russian lady of noble birth. She died in 1862, leaving a son. In 1864 Home was expelled from the city of Rome by the church authorities for his spiritualistic practices. For some years he was conspicuous in London, and in 1871 he married another Russian lady of rank. He has published a number of works on spiritualism.

HOME, Sir EVERARD, 1755–1832; was of Scotch extraction, and his connection with the Hunters brought him into notice early in life. At one time he was held in high estimation as a surgical practitioner. He was one of the surgeons to St. George's hospital; and this circumstance, added to the publication of various works which attained a considerable share of celebrity, contributed greatly to extend his reputation. In 1813 he was created a baronet, and was also appointed sergeant-surgeon to the king. He was the author of *Practical Observations on Stricture; Lectures on Comparative Anatomy;* and of various papers in the *Philosophical Transactions.*

HOME, HENRY (Lord KAMES), an eminent Scottish lawyer and author, was b. in 1696 at Kames, in Berwickshire. Destined by his friends for the law, he was apprenticed in 1712 to a writer to the signet; but he afterwards decided on adopting the highest branch of his profession, and qualified himself for it mainly by private reading and attendance at the courts. Entering the bar in 1723, he was raised to the bench in Feb., 1752, assuming the title of lord Kames, and was made one of the lords of justiciary in 1763. He died Dec. 27, 1782. In 1728 he published *Remarkable Decisions of the Court of Session from* 1716 *to* 1728. The materials of this work were in 1741 embodied in his *Dictionary of the Decisions of the Court of Session* during its whole history, which, though now superseded, was of great use to lawyers at the time, and was thought worthy of being continued by lord Woodhouselee. He is best known, however, by his *Essays on the Principles of Morality and Natural Religion* (1751), containing a solution of the question of human freedom, which brought on him the suspicion of infidelity, and raised considerable controversy in the courts of the church and through the press; his *Introduction to the Art of Thinking* (1761); and above all, his celebrated *Principles of Criticism,* the work on which his fame now chiefly rests. In 1773 appeared his *Sketches of the History of Man,* which may be found entertaining, but are now of very little scientific value. Though thus busily occupied with judicial and literary labors, he took a very active interest in agriculture and commerce, and wrote a useful tract on the former, entitled *The Gentleman Farmer, being an Attempt to improve Agriculture by subjecting it to the Test of Rational Principles.* His last work, *Loose Thoughts on Education* (1781), was written in his 85th year. See lord Woodhouselee's *Memoirs of the Life and Writings of Home* (2 vols. 4to, Edin. 1807).

HOME, JOHN, a Scotch clergyman and dramatist, was b. in 1722. He studied for the church, and was appointed to the parish of Athelstaneford, where he wrote his tragedy of *Douglas,* which was acted in Edinburgh, and received with the utmost enthusiasm. The production of this piece gave great offense to his clerical brethren, and he was finally compelled to retire from the ministry. He retired into England, where he obtained the protection of the earl of Bute, and received a pension. His other dramatic works are *Agis; Agnileia; The Fatal Discovery;* and *Alonzo*—every line of which has departed from the memory of mankind. He died in 1808.

It is difficult now to understand the enthusiasm with which *Douglas* was first greeted. It was praised by men of all ranks, and Burns—who should have known better—talks of Home having

Methodized wild Shakespeare into plan.

This enthusiasm has departed long ago. Still *Douglas* contains pathos, and amid its florid declamation there may be found not a few natural touches, and it is on account of these that it still haunts the stage in a shadowy kind of way.

HOME'LYN (*raia miraletus* or *maculata*), a species of ray (q.v.), common on the s. coast of England, and plentiful in the London market, but comparatively rare on the e. coast of Scotland. In form and appearance it more nearly resembles the thornback than the skate. On some parts of the British coast the homelyn is called sand ray. It is also known as the spotted ray.

HOMEOP'ATHY, from two Greek words signifying "similar suffering," is a system of medicine introduced into practice about the close of last century, by a German physician of the name of Hahnemann (q.v.). It is founded upon the belief that medicines have the power of curing morbid conditions similar to those which they have the power to excite; expressed in Latin by the phrase, *similia similibus curantur,* and in English by "like cures like." That diseases are cured by substances which produce in persons in health symptoms like those presented by a patient, has been from the earliest times a recognized fact, both by medical writers and by poets who have expressed the prevailing belief of the ages in which they lived. Among the former, we find the author of a treatise generally ascribed to Hippocrates, entitled *On the Places in Man.* This writer

gives numerous examples of what may be called *homeopathic* cures; and recommends for the cure of mania this remarkable prescription: "Give the patient a draught made from the root of mandrake, *in a smaller dose than sufficient to induce mania.*" The works of the poets abound with illustrations of this belief. Probably the oldest expression of it is in some lines ascribed by Athenæus to Antiphanes, who lived 404 B.C., which have been thus translated:

> Take the hair, it is well written,
> Of the dog by which you're bitten;
> Work off one wine by his brother,
> And one labor with another;
> . . . .
> Cook with cook, and strife with strife,
> Business with business, and wife with wife.

Shakespeare, in *Romeo and Juliet,* thus expresses the same maxim:

> Tut, man! one fire burns out another's burning;
> One pain is lessened by another's anguish.
> . . . .
> Take thou some new infection to the eye,
> And the rank poison of the old will die.

Milton, in the preface to *Samson Agonistes,* gives his version thus: "In physic, things of melancholic hue and quality are used against melancholy, sour against sour, salt to remove salt humors," etc. Thus, there has always been a vague tradition that medicines sometimes cured diseases similar to those they caused. But it was reserved for Hahnemann to propound the startling dogma, not only that medicines did occasionally produce such cures, but that true, direct, and radical cures could only be effected by recognizing this principle as the guide for the selection of the right remedy in any given morbid condition of the system. He engaged his friends and disciples in the task of procuring accurate data on which to proceed in reducing his rule to practice. They took given quantities of the substance which was the subject of experiment, and each kept a record of the effects it produced. The various records thus obtained were submitted to Hahnemann, who compared them together, and with his own observations on himself, and out of the results thus obtained, compiled what goes by the name of "a proving" of the medicine. Hahnemann lays it down as one of the fundamental propositions of homeopathy, that no medicine should be given to the sick which has not first been *proved* upon those in health. He devoted himself to this task, and has left ten volumes of such "provings;" out of this work the various abridgments in popular use in this and other countries have been derived. The properties once determined, then, it becomes possible to administer it in accordance with the principle of homeopathy. To do so, however, it requires that the medicine should be given by itself. Thus, the second proposition of Hahnemann's system is, "that only one medicine should ever be given at once."

To ascertain the effects of medicinal substances upon persons in health—from the knowledge thus obtained to select a remedy whose action corresponds with the symptoms of the patient under treatment—to give this remedy by itself alone, are three of the fundamental rules for the practice of homeopathy. The fourth is, that the dose of a homeopathic medicine should be so small as not to cause any general disturbance of the system, its action being limited to that portion of the body which is in a morbid condition. How small that is can be ascertained only by experiment. When Hahnemann propounded his system, he pointed out that the amount of the effect of a medicinal substance depends upon two conditions: *first,* the mechanical form in which it is administered; and *second,* the state of the body of the person who takes it.

For example, a hard pill of belladonna of five grains, swallowed by a robust and healthy man, may be followed by only trifling symptoms; but let that pill be dissolved in a pound of water, and an ounce of the solution be given every hour, then we shall have well-marked symptoms of the poisonous action of the drug. But if, instead of administering it to a person in rude health, it be given to one who is suffering from such an inflammation of the tonsils as belladonna produces, then we shall find that the inflamed tonsils will be most acted upon by their specific irritant. Disease implies a preternatural sensitiveness. An inflamed eye cannot bear light, an inflamed stomach cannot bear food, and every diseased organ is powerfully affected by the particular substance which has, in its physiological operation, a close affinity with the character of the morbid condition in which it is at the time its specific medicine is administered.

To arrive at the degree to which it was desirable to reduce the dose, a series of experiments were necessary. It was a matter to which all *à priori* reasoning was inapplicable. In an article published in *Hufeland's Journal* in the year 1801, Hahnemann observes: "You ask me what effect $\frac{1}{100000}$th of a grain of belladonna can have. The word *can* is apt to lead to misconceptions. Let us ask nature what effect $\frac{1}{100000}$th of a grain of belladonna *has.*" He then states the conditions of the experiment—viz., that this fraction of a grain should be administered to a patient suffering from a peculiar form of scarlet fever then prevalent in Germany, and presenting a combination of symptoms bearing a close resemblance to those produced by belladonna. Hahnemann

maintained that this fraction of a grain was sufficient for the purposes of homeopathic cure.

Homeopathic doses are often expressed by fractions, thus: Suppose the medicine to be a vegetable substance; a strong tincture is made of it, and this is technically called the *mother-tincture*. Two scales of dilution are now prepared from this, called respectively the *decimal* and the *centesimal*, which latter was that advocated by Hahnemann, while the former, though of recent introduction, is at present very largely employed. To prepare the *decimal* attenuations, 1 drop of mother-tincture is added to 9 drops of alcohol, and it is labeled 1^x. The *second decimal dilution* (2^x) is formed by adding 9 drops of spirit to 1 drop of 1^x, and so on for the 3^x, etc. In preparing the *centesimals*, 1 drop of mother-tincture is added to 99 drops of alcohol, so as to dilute it 99 times, and this preparation is called *the first dilution*, and marked 1. Again, a drop of number 1 —that is, of the $\frac{1}{100}$th of a drop of the mother-tincture—is mixed with other 99 drops of alcohol, and marked 2, or the second dilution. This contains $\frac{1}{100}$th of a drop of $\frac{1}{100}$th of a drop of the mother-tincture, or $\frac{1}{10000}$th of a drop of the mother-tincture. This simple process of subdivision is continued, and each step is recorded in the same way: thus, number 3 means a millionth; number 6, a billionth; and number 30 (which is the highest recommended by Hahnemann), a decillionth. Insoluble substances, of course, cannot be thus treated; they are triturated with sugar of milk. One grain, say, of sulphur is triturated with 99 grains of sugar of milk, forming *the first trituration*, and marked number 1, and so on; but after advancing to the fifth or sixth, then it is presumed that all substances become soluble in this very minute proportion in alcohol, and alcoholic dilutions are made of them in the same way as of the vegetable tinctures. After making these alcoholic preparations, the homeopathic chemist saturates with them minute pellicles of sugar of milk, known technically by the name of *globules* or *pilules*.*

A system so revolutionary naturally encountered most determined opposition. In Germany there were legal obstacles to its practice. In Austria physicians were not allowed to dispense their own medicines, even gratuitously; all medicines administered to the sick were prepared by the apothecaries, and the fate of homeopathy could not be trusted to their hands, as their interests were deeply involved. Thus it happened that, from the year 1818 to the year 1836, homeopathy was only tolerated in Austria under exceptional circumstances. In 1836 cholera broke out for the second time in Vienna, and Dr. Fleischmann, the physician to an institution in which homeopathy has been followed, was required by government to prepare the hospital for the reception of cholera patients. He undertook the charge, on the condition that he was to be allowed to employ homeopathy in their treatment. This was granted, homeopathy having been very successful in Vienna and different towns in Germany in cholera in 1830-31. He treated 732 cases; of these, 488 recovered and 244 died. The hospital was under daily inspection by the government, and the result of the treatment was made known to count Kolourat, the home-minister. Shortly after, the emperor issued an ordinance granting to every duly qualified physician the right of practicing homeopathy. The cholera mortality under homeopathic treatment was in this instance one in three, while the average mortality of the same epidemic at the same place was two in three.—Wilde's *Austria*.

When cholera was approaching western Europe, Hahnemann was studying his "provings," to ascertain what substance resembled most nearly in its effects the symptoms of the disease. The medicine he found to be camphor; and before he had ever seen a case of cholera, guided by the details given by practitioners, he announced in the year 1831: "Every one, the instant any of his friends is taken ill of cholera, must immediately give him camphor." This bold prediction, that camphor was the antidote for the first stage of cholera, was soon tested in Hungary and Moravia, and camphor has since been accepted universally by homeopathists as the most efficient remedy against an invasion of cholera.

The reported success of the homeopathic treatment of cholera at Vienna had a powerful influence in directing public attention to the hospital where the new system was practiced. Physicians from all parts of Europe and from America went thither to watch the treatment. In a report published by Dr. Fleischmann some years ago, it is stated that at that time he had treated 17,313 cases, chiefly of acute diseases. Among these were—of erysipelas, 514 cases, of which 510 recovered; of rheumatic fever, 1417, of which 1416 recovered; of intermittent fever, 1066, of which 1058 recovered; of inflammation of the lungs, 1052, of which 1004 recovered.

From Germany as a center, where it is now extensively practiced and taught, homeopathy spread over Europe and America. In America there are upwards of 2,000 avowed practitioners of the system. In France, Italy, Spain, and other countries it has numerous adherents, many of whom occupy influential positions of trust and authority. It was introduced into England in the year 1827 by Dr. Quin, physician to the king of the Belgians; and there are now above 300 registered practitioners in Britain

* It must, however, be borne in mind that small doses are not necessarily homeopathy, which consists in the administration of drugs according to the law of *similars*, the dose being a matter in which experience has guided to dilutions in many though not in all cases.

who have adopted it. In London there is a hospital capable of containing upwards of 100 patients, where lectures are occasionally delivered by appointed teachers.

The number of physicians who *avowedly* practice homeopathy has not greatly increased of late; but its adherents claim that the *actual* practice of it has been greatly augmented. In proof of this they point to the more recent text-books in medicine, published by the teachers of the dominant school; and to the recognition of the value of small doses of aconite in inflammatory fevers, arsenic in gastritis, ipecacuanha (in one-drop doses) in vomiting, etc.

The objections entertained by physicians to the so-called "homeopathic" practice of medicine are based, not upon any unwillingness to employ medicines whose action resembles more or less the features of the disease for which they are prescribed, but solely on the impossibility, according to the common view, of adopting this as a specific rule of practice, and especially as an exclusive and all-embracing law of therapeutics. The action of emetics in some kinds of indigestion, and of rhubarb in some kinds of diarrhea, are familiar examples in daily use, showing that ordinary practice is not regulated by any blind prejudice against what is called the homeopathic law of *similia similibus curantur;* but in these cases the physician does not in the least commit himself either in favor of or against the law, but rather sets it aside as a mere metaphysical abstraction, having nothing to do with the real principle of the cure, which is to be found in common-sense and experience, applied to the facts of individual cases and groups of cases. The true physician is not a sectary; he disowns all artificial formulas of cure, exactly as he disowns homeopathy; and he especially disowns the nickname of *allopathist*, invented for him by Hahnemann. His belief in remedies is not founded on extreme generalizations, and he refuses to be limited in his practice by any other technical rules than those derived from a fair view of facts investigated on the ordinary principles of positive science. It is very certain that Hahnemann's alleged "provings" have been rejected as in great part visionary by the great majority of those who have attempted to ascertain personally the effect of the same remedies; and it is equally certain that Hahnemann himself admits the general aggravation of diseases by homeopathic doses when administered in sensible quantities, and that the system of infinitesimal doses was with him simply a last refuge from the contradictory character of the results obtained under the earlier trials of remedies devised according to his assumed principle. The argument of physicians in general has been that the principle was false, and that the infinitesimal doses are its *reductio ad absurdum*. They admit freely that homeopathy has in some instances done good, by illustrating the spontaneous cure of disease, and correcting a blind faith in heroic remedies; but although individual converts of some local credit have here and there been made, there is not the slightest appearance of a movement in the profession towards adopting homeopathy as a system, and its much-vaunted statistics are generally regarded as extremely fallacious.

HOMEOP'ATHY (*ante*) was introduced into the United States in 1825 by Hans B. Gram, a native of Boston, educated in Denmark. Eminent physicians of the old school, after careful study and observation, gave it their adherence. It was adopted in other places, and the practice has grown steadily to the present time, when there are in the country probably not less than 7,000 physicians of this school; 10 or 12 homeopathic colleges, graduating annually from 200 to 300 students; 40 homeopathic dispensaries; more than 30 homeopathic hospitals; and 15 periodicals devoted to the system. Its literature embraces works by men eminent for learning and ability. While homeopathic physicians agree in accepting the fundamental teachings of the system, there is considerable diversity of practice among them in regard to detail, especially as to the use of high attenuations.

HO'MER, the greatest name in the history of epic poetry, and who stands as high in that department as Shakespeare does in the drama, has come down to us in modern times unfortunately as little better than a name, and presents materials for biography as scanty as those which he offers for criticism are rich. We are not, however, forced to go to such lengths of doubt in his case as Aristotle did in the case of Orpheus, denying that such a man ever existed; for though the Germans, since the days of Heyne, Wolf, and Niebuhr, have indulged themselves in every variety of historical skepticism, and reduced Homer, as well as Cadmus and Hercules, to mere "symbols," the more sober genius of British criticism, with which the moderate views of the best later Germans coincide, has pronounced an almost unanimous verdict in favor of the historical reality of the author of the *Iliad* and the *Odyssey*. Not that any reliance is to be placed on the details of the old Greek lives of Homer, which are manifestly fictitious; but the internal evidence of the poems themselves leads to the belief in an authorship such as agrees substantially with the kernel from which these very ancient legendary traditions were developed. The central fact in which all these traditions agree is that the author of these poems was an Asiatic Greek; and though other places are named, the greatest amount of legendary evidence clearly points to Smyrna as the city which had the honor of giving birth to the father of epic poetry. The dialect in which the *Iliad* and *Odyssey* are written—the Ionic—is the very variety of Greek which was afterwards used in the same region by Herodotus, the father of history, and by Hippocrates, the first and greatest of Greek physicians; and the allusions to natural phenomena, especially the fre-

quent mention of the strong n.w. wind blowing from Thrace, plainly indicate the w. coast of Asia Minor as the familiar residence of the poet. The chronology of the Homeric poems, both as respects the great central event which they celebrate—the Trojan war—and the age of the poet himself, is much more doubtful; but it is quite certain that Homer lived considerably before the recognition of a regularly received record of dates among the Greeks—that is, before the year 776 B.C., the commencement of the calculation by Olympiads. The date given by Herodotus for the age of Homer—400 years before his own time; that is, about 850 B.C.—is probable enough; but considering the entire want of any reliable foundation for chronology in those early times, we must not seek an accuracy in this matter beyond that which was attained by the Greeks themselves, and allow a free margin of at least 200 years from the time of Solomon (1000 B.C.) downwards, during which the singer of the *Iliad* and *Odyssey* may have flourished. To throw him further back than the earliest of these dates would be inconsistent at once with the historical elements in the midst of which his poems move, and with the style of the language which he uses; for this exhibits a luxurious freedom, a rich polish, and an exquisite euphony, which remove it far from that roughness and clumsiness which is wont to characterize languages in their earliest stage of literary development. The Ionic dialect used by Homer is, in fact, a highly cultivated shoot of the old Hellenic stock, and which was in the poet's hands so perfect for the highest poetical purposes as to have remained the model for the epic style during the whole period of the poetical literature of the Greeks.

In endeavoring to form a correct estimate of the position of Homer as a poet, the primary fact from which we must start is that he was not the epic poet of a literary age—like Virgil among the Romans, Tasso among the Italians, or Milton among ourselves—but he was decidedly and characteristically an *aoidos*, or *minstrel*, a character well known to us from our own mediæval literature, both in other shapes, and specially as it has been presented to us by the kindred genius of sir Walter Scott. That there is an essential and vital generic distinction between the popular minstrel of an age when books are either not known or little used, and the cultivated poet of an age which rejoices in all sorts of libraries, and possesses a special class of literary readers, admits of no doubt. The conditions of the work to be done being different, the work itself cannot possibly be the same. It is quite certain, however, that the great majority of the critics and translators of Homer in this country have not recognized this distinction. The consequence is that they strike an entirely false note, and blow the seraphic trump of Milton when they should be content to take a plain shepherd's pipe in their hands. These critics and translators are no doubt actuated by the very noble desire of redeeming the author of two such noble poems as the *Iliad* and the *Odyssey* from the vulgar fellowship of wandering minstrels and ballad-mongers; but however high the genius of Homer unquestionably soared above the best of the mediæval ballads to which the English ear is accustomed, it is quite certain both that the materials out of which his great poems were composed were nothing but such popular ballads and tales as delighted our forefathers before the invention of printing, and that the spirit and tone of the Homeric epos is distinguished from that of the literary epos or epos of culture precisely by those characteristics which distinguish our old ballads from the poetry of Wordsworth and Tennyson. Of modern poets, the one who possessed the greatest relationship to the genuine old minstrel poets was sir Walter Scott; but even in his poetry many peculiarities can be pointed out which mark the literary writer of a later age, as distinguished from the popular singer of a people's boyhood and lusty youth. In order to understand Homer, therefore, we must look on him as the culmination of the minstrel or ballad poetry, in the shape of the minstrel epos; a grand combination of popular ballad materials and ballad tone, elevated to the highest pitch of which it is capable, with the architectural form and structure of the epos. To the recognition of this true character of the Homeric poems, the present age has been led mainly by the adventurous and suggestive criticism of the celebrated scholar, Frederick Augustus Wolf. This distinguished German, originally a professor in Halle, afterwards in Berlin, published in the year 1795 the *prolegomena* to a new recension of the text of Homer, in which he maintained the extreme skeptical view already alluded to, according to which the *Iliad* is no proper epic poem in the sense that the *Æneid* and *Paradise Lost* are so, but only a skillful compilation of popular ballads, originally separate, and of whose separate existence the sharp-eyed critic can now easily adduce satisfactory proof. Now, this theory, commonly called after its author, the Wolfian theory, and which has found, and still finds, not a few most ingenious supporters in Germany, contains an important element of truth, which has too often been summarily rejected, along with the error which it promulgates. It is not credible that poems pervaded by such a wonderful unity of tone and plan as the *Iliad*, manifestly also inspired by a genius of the highest order, should be resolvable into the mere patchwork of skillful compilers; but it is an important truth to announce that the materials of Homer's poetry were not invented by himself, but taken up from the living traditions of the people to whom he belonged, and that even in the grand unity to which his genius has subjected them, their original popular tone and spirit is preserved in a fashion which characteristically distinguishes them from all epic poetry of the literary ages. There can be no doubt that the merits of Wolf in this regard will soon be as universally recognized in every other country as they have long

been in Germany; but, in the mean time, it is to be lamented that of those who have written most largely on the subject, neither col. Mure nor Mr. Gladstone has been able to exhibit to English readers the true golden mean in this matter between the extravagance of the ultra-Wolfians and the falsetto of the anti-Wolfian critics and translators. Among the Germans, Welcker, Nitsch, and K. O. Müller may be named as presenting the best models of judicious and well-balanced criticism in this slippery domain.

The characteristics of Homer's poetry, as the culmination of ballad poetry and the grand model of the minstrel epos, may be expressed in a very few words. In the first place, the materials are essentially national, and if not strictly historical in every detail of decoration, grow, like all ballad poetry, out of the real life of the people, and rest at least upon an honest historical substratum. In this view, the *Iliad* is as valuable for the earliest history of the Hellenic race as Herodotus and Thucydides are for the later periods. But it is not for the Greeks alone that Homer possesses an important historical value; he is for all ages an important record of the earliest stages of human society, second only to the books of Moses and perhaps some of the very oldest of the Vedas. The first germs of almost all other arts and sciences afterwards cultivated by the Greeks and Romans are to be found in Homer. In this view, he was to the Greeks themselves an encyclopædia of their national culture; and, as embodying the grand features of their polytheistic faith, he is also constantly quoted by their great writers with all the deference due to a Bible.

The poems of Homer, as a great human inheritance, have naturally been incorporated, by translation, into all the languages of Europe. In Italian, the translations of Cesarotti and Monti; in French, that of Montbel; in German, that of Voss, are the most famous. In England we have tried this great problem in the most various styles, and have produced specimens of brilliant success in certain partial aspects. The whole excellences of Homer have not yet been exhibited in any one of the notable English translations, nor is such a combination perhaps possible. The grand flow, rapid march, and sonorous fullness of the original are well given by Pope; the rough dramatic vigor of individual phrases and passages are best rendered by Chapman; while the unaffected truthfulness and easy, unpretending grace which so prominently mark the great Smyrnean minstrel appear most clearly in Cowper. Of the recent attempts which have been made, and are making, to present Homer in some new aspect to English readers, it is premature to speak. We may mention the translations of Newman (1856), Worsley (1861–65), Dean Alford (1861), Sincox (1865), lord Derby (1865), John Stuart Blackie (1866), Herschel (1866), Merivale (1869), and W. C. Bryant (1870–71).

Those who wish to enter more minutely into the various questions connected with Homer and the Homeric poems may consult the works on Greek literature by col. Mure and K. O. Müller; the special work on Homer by Mr. Gladstone; the article "Homer" in Dr. Smith's *Dictionary of Ancient Biography;* and the article "Homer" in the *Encyclopædia Britannica.*

HOMER, a t. and village in Cortland co., N. Y., on the Syracuse and Binghamton railroad, 27 m. s. of Syracuse; pop. of t., 3,657. In the village are several churches and a number of manufactories.

HOME RULE. The title chosen to define the object of a political organization in Ireland, and of the party in the British parliament representing that organization. The discouragement among the extreme Irish agitators which followed the suppression of the Fenian rising in 1867 opened the way for those who favored more constitutional methods of asserting the claims of the Irish people. The disestablishment of the church inclined many Protestant conservatives to co-operate with politicians of this stamp. At a meeting held in the Bilton hotel, Dublin, on May 19, 1870, presided over by the lord-mayor, a Protestant conservative, and attended by prominent conservatives, Orangemen, Catholic liberals, nationalists, repealers, and Fenians, a resolution was adopted "that the true remedy for the evils in Ireland is the establishment of an Irish parliament with full control over our domestic affairs." An organization entitled "The Home Government Association of Ireland" was formed, the object of which was stated in the rules to be to obtain for the country the right of managing its own affairs by a parliament assembled in Ireland, which should legislate for and regulate all matters relating to the internal affairs of Ireland, and have control over Irish resources and revenues, subject to the obligation of contributing a just proportion of the imperial expenditure. Such matters as the adjustment of relations with foreign states, colonies, and dependencies, and the defense of the empire, were to be left to the imperial legislature; and the new adjustment of the relations between the two countries was to be attained "without any interference with the prerogatives of the crown, or any disturbance of the principles of the constitution." This programme, according to those who put it forth, was at once less and more than the repeal which O'Connell had demanded. It implied a surrender of any Irish claim to control imperial supplies, but demanded a responsible Irish administration. Mr. Butt, q.c., who had become popular through his exertions in defense of the Fenian conspirators, and who had since been president of the amnesty association, took the lead of the new movement, which showed its strength in 1871 by carrying its candidates at by-elections for Meath, Galway, and Westmeath counties, and for Limerick borough, where Mr. Butt was returned unopposed. In 1872

the association continued to gain influence, and adopted "Home Rule" as its watch-word. In Nov., 1873, a national conference was held in Dublin: it was attended by 900 delegates from all parts of Ireland. The home government association was dissolved, and a new organization, entitled the home-rule league, which took its place, adopted the programme of the older body without important alteration. At the general election in Feb., 1874, the home rulers carried 60 seats. In the following month the movement first asserted itself in parliament. Mr. Butt moved an amendment to the address expressing dissatisfaction with the existing system of government in Ireland. In his speech he defined home rule as leaving the management of all exclusively Irish affairs to an Irish parliament, and he asked that constitutional self-government should be conceded to his country. The amendment was rejected by 314 to 50. In the three following sessions a motion for a committee to inquire into the causes of Irish discontent was brought forward, but on each occasion defeated by a large majority. Symptoms of disagreement soon appeared in the home-rule party itself. Mr. Butt favored a policy of incessantly proposing reforms in the details of Irish legislation, while also urging on parliament the general objects of the party. The more extreme section, of which maj. Nolan and Mr. C. S. Parnell soon came to be recognized as leaders, regarded this as too moderate a plan of campaign, and devoted themselves to the task of rendering the imperial parliament unable to discharge its functions by the dexterous use of the method of obstruction. Stormy conferences of the home-rule league were held in Dublin in 1876 and subsequently. Mr. Butt nominally retained the leadership, but it was evident that a strong section of the party approved Mr. Parnell's tactics, and by the beginning of 1878 the control of parliamentary action and of the movement generally had passed out of the hands of Mr. Butt, whose death, early in 1879, may be said to have marked the close of the original and more moderate phase of the home-rule agitation.

HOME RULE FOR IRELAND. How to rule Ireland peaceably and well has been a problem ever since its annexation. Irish agitations have passed into a by-word, and as many schemes have been propounded for the amelioration of the condition of the country as would number the years of British rule. The Fenian outbreak (1864) led to so much suffering for all classes, and entailed such misery upon many utterly innocent of its principles, that the attention of the ablest men in the distracted country was directed to some project which, while leaving Ireland substantially under the British rule, should secure for it free legislation in matters of internal interest. Hence arose the home-rule league, first suggested by the able and far-seeing Isaac Butt, member for Dublin, and for many years controlled by him and largely influenced by John Francis Maguire, M.P. for Cork. Its professed object was to declare the right of the Irish people to self-government, and to establish the principles of a federal arrangement, by which the right of legislating for and regulating all matters relating to the internal affairs of the country should be secured to an Irish parliament, consisting of an equal number of Protestants and Roman Catholics, leaving to the imperial parliament all questions affecting the imperial crown in its relation to other countries, and, in short, all and everything pertaining to the defense and protection of the empire at large. Mr. Butt advocated a government for Ireland as a constituency of Great Britain, such as obtains in the United States, where each individual state is self-governed and yet represented in the national congress. In 1871 Isaac Butt was returned as member for Limerick, and two years later the first convention of the home-rule league was held in Dublin. At the succeeding election (1874) its popularity was demonstrated, 60 members from Ireland being returned upon its merits, and 28 in England solemnly engaging to support it; nevertheless a motion in the houses in its favor was defeated by 314 to 52, and, in the following year, Mr. Butt's motion for a committee on the subject was negatived three several times. A stormy convention was held at Dublin in 1877, which was followed by increased activity on the part of the home-rule members in the houses, Mr. Butt still being the chosen leader of the party. In 1878 he resigned, and the principles of the home-rule party having undergone a change, it has lately become apparent that their ultimate object is the establishment of an Irish parliament in which four-fifths of the members will be Roman Catholics.

HOMESTEAD LAWS, laws enacted by a majority of the states composing the American union, exempting a homestead of greater or less value from attachment for debt, and reserving the same for the benefit of the owner's family. The laws of the several states making such a provision are exceedingly various both as to the value of the estate reserved, the circumstances and conditions under which the exemption takes place, and the ways in which it is brought to a termination. The value of an exempted homestead in some states is limited to $300, in others to $500, in others to $1000, in others to $1500, in others to $2,000, in others to $3,000, and in others still to $5,000. The homestead laws have been enacted within the last fifty years, in order to remove the hardships of the common law as respects wives and children. They impose a limitation on the power of a husband and father to distress his family by alienating the estate which he may have received in whole or in part from his wife, or of which he has become possessed in part by her labors and sacrifices. It is held to be sound public policy to guard the homes of the people from seizure and sale at the pleasure of creditors, as well as from a too easy

alienation by husbands and fathers. The practical effect of these laws has served to commend them to general favor, and they are likely to be permanent. It is not improbable that they may even undergo some modifications with a view to the more effectual protection of the rights and interests of women and children.

HOM'ICIDAL MA'NIA. This is the *monomanie meurtrière* of the French. There is developed, under certain morbid conditions, a blind, irresistible tendency to destroy life. It is independent of hatred, or any appreciable incentive; and even acts in opposition to the general disposition, the interests, and the affections of the perpetrator. Dr. Otto of Copenhagen has recorded a series of motiveless murders. Georget gives the case of M. N., who was silent and solitary, but reasonable, and confessed a desire to shed blood, and particularly that of his mother and sister by poniard. He deplored the dreadful tendency, for he loved them both tenderly. Yet the fit returned, and he cried out: "Mother, save thyself, or I will cut your throat!" The victim selected is most frequently a child, a wife, a benefactor, or an object of love and respect. Hoffbauer, in Germany; Esquirol, Marc, Foville, in France; and Conolly, in Britain, have all demonstrated, and in criminal courts have testified to, the existence of this form of mental disease and ground of irresponsibility; but no recognition has been obtained of the irresistible, motiveless homicidal tendency as a bar to trial or to punishment. The impulse, however, is manifested in a more complicated form. It may originate in delusions; and the act which first reveals the mental condition may be committed in supposed self-defense, or to secure the salvation or prevent the suffering of the individual destroyed. Such manifestation may constitute the characteristic symptom of furious madness, where the excited maniac sacrifices all around, or all who resist his course, under the instigation of the predominating passion, or of melancholia and despondency. There occur periods when the tendency to shed blood becomes epidemic or imitative. There is in many natures an ill-defined satisfaction on hearing of slaughter, wars, and atrocities; and such details, or the sight of blood, are said to be suggestive of this tendency. Marc states that six cases of infanticide followed immediately upon the publication of the trial and history of Henriette Cornier, who cut off the head of her child. The puerperal condition, various hereditary tendencies, powerful moral impressions, and atmospherical influences are conceived to induce this tendency. The proximate cause is generally found to consist in marked organic changes in the nervous system, such as are detectable in epilepsy; or in the more insidious and obscure structural alterations which are supposed to accompany perverted and depraved instincts; although homicidal mania may occur independently of either of these pathological conditions.

Esquirol, *Des Maladies Mentales*, t. ii. p. 115; Marc, *De la Folie*, etc., t. ii. p. 24; Yellowlees, *Homicidal Mania*, *Edinburgh Medical Journal*, Aug., 1862.

HOM'ICIDE, a term used in English law to denote the mere killing of a human being without implying the attendant criminal responsibility. It is used with the word *justifiable*, to denote that the killing was done under lawful authority, as hanging a man or killing a prisoner to prevent him escaping, or killing one to prevent an atrocious crime being committed. *Excusable homicide* means killing in self-defense, or in defense of a wife, child, parent, or servant, or property, or by mere accident. *Felonious homicide* includes murder of one's self or of another; and *manslaughter* is killing without malice, but attended with negligence, hot blood, or in some unlawful way. In Scotland excusable homicide is generally called culpable homicide.

HOMICIDE (*ante*), the killing of one human being by another either innocently or feloniously. To say that there has been a homicide does not necessarily imply that a crime has been committed; for, though every murder is a homicide, every homicide is not a murder. The law permits a man to kill another in self-defense when his own life is assailed or threatened; but the danger must be real, or in good faith and for sound reasons deemed so by the person threatened. A man may lawfully kill another, after due warning, in defense of his property, or to prevent the escape of one who has committed a felony. An officer of justice charged with the duty of arresting a criminal or with the performance of any other lawful act may kill a person who resists or attempts to thwart him by force. A person charged with felony, seeking to escape after arrest or fleeing to avoid capture, may be lawfully killed by an officer if he cannot otherwise be taken. A man engaged in committing a felony may be lawfully killed by an eye-witness if there be no other way of preventing the crime. The keeper of a prison may, if necessary, prevent the escape of a prisoner by taking his life. In all such cases, however, it must appear that the killing was resorted to as a last alternative. Justifiable homicide is the term applied in law to all such cases. Where one kills another by accident, without any intention to do him injury, and while exercising a proper degree of caution, the law deems it an excusable homicide; as, for example, when a man driving in the highway in the darkness runs over and kills another without knowing it, or, discovering the danger, has yet no time or power to avert the calamity. The line between justifiable and excusable homicide is vague and, in a legal sense, not important, since neither the one nor the other exposes a man to punishment. In some of the states of the union no distinction is made between them. See MURDER, *ante*.

HOM'ILDON, BATTLE OF. In the autumn of 1402 a Scottish army of about 10,000 men invaded England, under the command of sir Murdach Stewart of Kincleven, the

eldest son of the regent Albany, and of Archibald earl of Douglas. They advanced to the gates of Newcastle without opposition, and were returning to Scotland laden with spoil, when they were encountered by an English force under the earl of Northumberland, his son Hotspur, and the exiled earl of March or Dunbar. The Scots took up their position on Homildon Hill, near Wooler. On Sept. 14 Hotspur was advancing to charge them, when he was stopped by the earl of March until the English archers should do their work. Their shafts were poured with such effect that, in the words of a contemporary chronicler, they bristled in the dense ranks of the Scottish army like quills upon a hedgehog. At length a gallant knight, sir John Swinton, cried out: "Brave fellow-countrymen! what has this day bewitched you that you stand here to be shot like deer in a park, instead of proving your courage, as of old, by meeting your foemen hand to hand? Let those who will rush, rush down with me, in the Lord's name, upon the enemy, and either save our lives or fall with honor." At these words, Adam of Gordon, who was at mortal feud with Swinton, sprang forward, and throwing himself on his knees, besought the honor of knighthood from the warrior, whom he must now look upon as the best knight in Britain. His request was granted; and the two knights, followed by about a hundred retainers, rushed upon the English ranks. They were slain to a man, but not before they had made such slaughter that the English captains were said to have confessed that if all the Scots had fought as well, the day would have had a different issue. As it was, the English had an easy victory, and the Scots were utterly routed. Their leaders were taken prisoners; five of their best knights, with many of their bravest esquires, were slain; and besides the numbers that were killed on the field by the English arrows, about 500 were drowned in attempting to cross the Tweed.

HOMILETICS, that particular branch of sacred rhetoric which regards the composition of the familiar discourses known under the name of homily. The earliest writer on the subject of homiletics is St. Augustine, whose book, *De Doctrina Christiana*, is in some sense an adaptation of profane rhetoric to sacred uses. Rabanus Maurus and Isidore of Seville also incidentally treat the subject; but the nearest approach to a systematic treatment of the subject in mediæval literature is to be found in Hunibert, *De Eruditione Concionatorum*. St. Carlo Borromeo's *Instructiones Pastorum* was a part of his general scheme for the improvement of clerical education; and in the ecclesiastical course, as well of Catholics as of Protestants, homiletics occupies an important place. The bare enumeration of the works of Schott, Marheineke, Theremin, Sailer, Gisbert, Brand, Laberenz, may show the importance which is attached in both churches to this branch of sacred science.

HOMILIARIUM, a collection of homilies for the use of pastors. Such collections were in use from a very early period. Mabillon mentions a very ancient Gallican homiliarium (*De Lit. Gallican.*). The fifty homilies of Venerable Bede, too, were in familiar use among the clergy in all parts of the west, and we find in the letters of the early mediæval time traces of a busy interchange of sermons, original or otherwise, between bishops and clergy, even in distant countries. The supply, however, was imperfect and scanty, and one of the many reformatory measures of Charlemagne was a compilation of homilies under the title of homiliarium, which was made under his direction by the deacon Paul Warnefried. It was compiled in the end of the 8th c., and contains homilies for all the Sundays and festivals of the year. Many synods of that and subsequent periods directed the clergy to translate these sermons for their flocks, and the collection continued in use for this purpose down to the 16th century. It was printed at Speyer in 1482, and again at Cologne in 1557. A collection of homilies is also ascribed to Alcuin, but it seems more likely to have been but a modification of the homiliarium of Warnefried. A collection of English homilies turned into verse, that they might be more readily remembered by the people, appears to have been composed about the middle of the 13th century. This collection, affording a metrical sermon for every Sunday and festival day in the year, exists in MS.; and a portion of it has recently been edited by Mr. Small, librarian to the university of Edinburgh.

HOMILIES OF THE CHURCH OF ENGLAND, a collection of sermons, the first part of which was published in 1547, the first year of the reign of Edward VI., to be read in the churches, partly in order to supply the defect of sermons, but partly, also, to secure uniformity of doctrine, and to guard against the heterodoxies, old and new, which at that time threatened the unconsolidated church. The second part was published in 1562, at the same time with the articles, under Elizabeth. The 35th article declares that "the book of homilies doth contain a godly and wholesome doctrine, and necessary for these times." The titles are enumerated in the article, and are 21 in number. The homilies are not now read in churches; but there is no law to prevent their being so read, and they are frequently appealed to in controversies as to the doctrine of the Anglican church on the points of which they treat. The precise degree of authority due to them is matter of doubt.

HOMILY (Gr. *homilia*, converse) primitively signifies a discourse held with one or more individuals, but in ecclesiastical use it means a discourse held in the church, and addressed by the minister to the congregation. The practice of explaining in a popular form the lessons of Scripture read in the synagogues had prevailed among the Jews,

and appears to have been adopted in the Christian churches from the earliest times. The discourses employed for this purpose were of the most simple character; but with the exception of one ascribed to Hippolytus (q.v.), we have no sample of this form of composition earlier than the homilies of Origen in the 3d century. Taking these as a type, the early Christian homily may be described as a popular exposition of a portion of Scripture, accompanied by moral reflections and exhortations. It differs from the sermon (Gr. *logos*, Lat. *oratio*) in eschewing all oratorical display, and in following the order of the scriptural text or narrative, instead of being thrown into the form of a rhetorical discourse or a didactic essay. The schools of Alexandria and Antioch appear to have been the great centers of this class of sacred literature, and in the early centuries we find the names of Hippolytus, Metrodorus, Clement of Alexandria, Dionysius, and Gregory Thaumaturgus as principally distinguished. But it was in the following centuries that the homily received its full development in the hands of the oriental fathers, Athanasius, the two Gregories, of Nyssa and of Nazianzum, Basil, the two Cyrils, of Jerusalem and of Alexandria, and, above all, Chrysostom; and in the west, of Ambrose, Augustine, Peter Chrysologus, Leo, and Gregory the great. In later centuries, Venerable Bede, the popes Sabinian, Leo II. and III., Adrian I., and the Spanish bishops Isidore of Seville and Ildefonsus continued to use the homiletic form; and even in the modern church many preachers have regarded it as the best medium of scriptural instruction; and two different forms of homily are distinguished, the higher and the lower. The former follows the order of matter, rather than of any scriptural passages assumed to be expounded; the latter is a purely exegetical and moral exposition of some lesson from the liturgy, or of some other extract from holy Scripture.

It is right to add, however, that this strictly historical acceptation of the name homily is by no means uniformly observed in modern use. The name homily is very frequently used, almost as a synonym for sermon, and signifies nothing more than a plain, moral discourse, without ornament or rhetorical pretension, but also without any pretension of being molded upon the ancient patristical model.

HOM'INE REPLEGIAN'DO, an old writ in English law, meaning to bail a man out of prison; now disused.

HOMIN'IDÆ (from *homo*, and meaning "man family"). Some naturalists place man in the same order with the QUADRUMANA, classifying him in the subordinate position of a family. To this family they have given the name *hominidæ*, of the order PRIMATES, which includes the apes and monkeys. Certain structural affinities are offered as grounds for this classification, but many naturalists reject the reasons, and maintain, with prof. Owen, that "man is the sole species of his genus, the sole representative of his order." The generally adopted classification is that which includes man with the type or branch of VERTEBRATES and class MAMMALIA. So far, it is allowed, the analogy holds good between man and certain lower orders of animals; but when we come to divide the great class of mammals into orders, it is held that there are certain distinguishing characteristics which separate man from all the rest. The nearest approach to him is in the apes, but these animals are all four-handed, and it is contended that they have nothing which can be regarded as at all parallel with the foot of the perfectly erect-standing man, and that their whole organization is totally unfitted for that posture. Naturalists have, therefore, usually given man an order by himself, the order BIMANA, and in this he has been grouped into different races and varieties; but any division into genera, under this order, is of course inadmissible. See BIMANA and MAN, *ante*.

HOMOCERCAL. See HETEROCERCAL, *ante*.

HOMOGANGLIA'TA (Gr. *homos*, the same, and *ganglion*, a ganglion), the name given by Owen to the *articulata* of Cuvier, in accordance with a belief in the great importance of the nervous system as a basis of zoological classification. Each segment in the lowest homogangliata contains a pair of ganglia with nerves proceeding from them; all, however, communicating by nervous filaments, and constituting a continuous chain. In the higher forms there is a greater concentration, and a more evident allotment of the ganglia of particular segments to particular functions.

HOMOLOGA'TION, a Scotch law-term, denoting an act or conduct which confirms or approves of something which otherwise might be invalid. Thus, an informal deed, though useless in itself, yet, if acted on by one or both parties, will be set up and made valid, as against the party homologating. To constitute homologation, a clear knowledge of what the party is doing is necessary. The term is not used in English law, but similar effects are produced, and bear other names, such as confirmation, estoppel, part performance.

HOMOL'OGOUS quantities or magnitudes in geometry are such as correspond, or are like to one another. For example, in similar triangles, the homologous sides are those which are opposite to corresponding angles. See HOMOLOGY.

HOMOL'OGY, in anatomy, is the term now used to indicate structural correspondence, while the term *analogy* is employed to indicate functional resemblance. Thus, by homologue is implied "the same organ in different animals, under every variety of form and function;" while by analogue we understand "a part or organ in one animal which has the same functions as another part or organ in a different animal." For example, the

wings of an insect are the analogues of those of a bat or bird, but not the homologues; whilst the latter are homologues with the arms of man, the fore-legs of quadrupeds, and the pectoral fins of fishes. For further illustration, see Owen *On the Archetype and Homologues of the Skeleton.*

HOMOLOGY, in chemistry, is used to express agreement of composition or structure in organic bodies. See BOILING OF LIQUIDS: under which title the tables—given to show the differences of boiling points corresponding to differences in the chemical structure of certain liquids—are tables of homologous alcohols and acids. The members of the homologous series differ by the addition or subtraction of certain organic radicals.

HOMŒOPATHY. See HOMEOPATHY.

HOMOOU'SIAN (Gr. *homos*, the same, and *ousia*, substance), and HOMOIOUSIAN (Gr. *homoios*, like, and *ousia*, substance), two terms that long distracted the primitive church. The first was the shibboleth of orthodoxy in the Arian controversy, the decree of the council of Nice, which declared the Son to be *homoousian*, of the same substance with the Father. The rigid Arians, who resisted the decree of Nice, of course rejected the term. The semi-Arians, who held the subordination of the Son to the Father, were divided as to its use. Some of them rejected the word altogether, as directly conveying a false idea; others, while they did not absolutely reject the idea, regarded the word as objectionable, but rather as susceptible of misinterpretation than as absolutely false. Both parties argued against its use from a decree of the council held at Antioch in the year 269, against Paul of Samosata, in which the name homoousian, as applied to the Son, was expressly condemned. They contended, therefore, that the fathers of Nice had erred in applying it, and they proposed to substitute for it the term *homoiousian* (of a like, i.e., a similar but not identical substance with the Father). Without entering into the doctrinal controversy, it will suffice to say that the term, as used by the council of Antioch, bore a very different signification from that which the fathers of Nice attached to it. In the controversy with Paul of Samosata, who, with the Sabellians, held that the Father and the Son have but one and the same person, the word *ousia* was employed to signify personality. Hence, when the council condemned the doctrine of Paul, that the Son is homoousian with the Father, it merely declared that the Father and the Son are not one and the same person. On the contrary, the council of Nice, in defining that the Father and Son are homoousian, understand *ousia* in the very different signification of substance or nature. See the historical treatises of Athanasius, Newman's translation.

HOMOP'TERA (Gr. *homos*, the same, uniform, and *pteron*, a wing), according to some entomologists, an order of insects; according to others, one of the two great divisions of the order *hemiptera* (q.v.), differing from the *heteroptera* in having the first pair of wings of uniform substance throughout (whether perfectly membranous or somewhat leathery, and so passing into elytra), and the rostrum or sucker originating from the inferior part of the head near the thorax, or even between the first pair of legs. The homoptera feed on the juices of plants, and some of them are very troublesome to farmers and gardeners. The females of many have an *ovipositor*, by means of which they pierce plants in order to make a place for the reception of their eggs. The larvæ are active, and resemble the perfect insect, but are wingless. The pupæ are also active, and have rudimentary wings. Among the homoptera are cicadas, the largest of the order, lantern-flies, froth-hoppers, aphides, and the coccus tribe.

HOMPESCH, FERDINAND VON, 1744–1803; b. Germany, of a noble Prussian family. At 12 years of age he went to Malta in the capacity of page to Rohan, grand-master of the knights of St. John, and rapidly rose to position in the order, and became the last grand-master. The seizure of Malta by Bonaparte in 1798 induced Hompesch to resign his mastership to the czar of Russia, who granted him a pension. He died in France in very poor circumstances.

HOMS, or HUMS. See HEMS, *ante.*

HONAN', one of the central provinces of China, having an area of 66,900 sq.m. and a population of 29,069,771. Its capital, Kaifung-fu, is situated on the Yellow river, from which it has often suffered, the river-bed being here elevated above the adjacent country. It has been overflowed nineteen times. In the reign of Fuhi (2852 B C.) it was the capital of China. It has suffered various vicissitudes. In the 12th c. of our era it was six leagues in circumference. At present the city is uninteresting to Europeans, save as the residence of the Jews of China, now dwindled to a few families.

HONAWAR', a seaport on the Malabar or w. coast of the peninsula of Hindustan, is a t. in the district of Kanara (north) or Honawar, in the presidency of Bombay. It is in lat. 14° 17′ n. and long. 74° 30′ e., being 340 m. to the s.e. of Bombay. It stands on the n. side of an inlet of the Arabian sea, which receives the Gerseppa or Sheravatti from the western Ghauts. Though both the harbor and the anchorage outside have a good bottom and a sufficient depth, yet, in the season of the s.w. monsoon, the surf is a serious impediment to navigation. Pop. '72, 5,191.

HONDEKOETER, MELCHIOR, 1636–95; a Dutch animal-painter. His father and grandfather had both made a considerable name in that walk of art, but their fame was

soon eclipsed by his. Though he painted every kind of animal, his favorite subjects were cocks, hens, ducks, and peacocks, which he delineated with wonderful correctness and truth. It is said that he trained a cock to stand in whatever attitude he desired, and to remain in that position for several hours at a time without moving a muscle. The landscapes which he introduced as backgrounds to his pictures were equally true to nature, and finished with a delicate lightness and transparency of touch that harmonized admirably with the subject of the piece. In his special line he is still unrivaled, and his pictures, of which the best are in English collections, command high prices.

HONDO. From *hon*, main, chief, and *do*, continent or island, the name of the chief island of the empire of Japan; often, but incorrectly, called Nippon or Nihon. Nippon is not the name of any one island, but of the entire Japanese empire. In ancient times the Japanese had no need to give a special designation to their largest island, since they divided their country not into islands, but into *do* or circuits, in which insular boundaries were ignored (see JAPAN); just as we say "middle states," "western states," etc. Of late years the Japanese, studying geography in the western fashion, and seeing the necessity of a name for their chief island, have called it Hondo. (See the excellent geography issued by the Japanese war department, 1874, with accompanying copperplate map of Japan.) The application of the erroneous name Nippon (incorrectly spelled Nipon or Niphon) to the chief island originated with Kampfer, the Jesuits who wrote previously to him knowing Japanese geography too well to use the misleading term. Hondo contains an area officially computed in 1874, at 87,425 sq.m., with a population, by census of 1874, of 25,166,531. It comprises the circuits of Tokaido, Kinai, Tozando, Hokurikudo, Sanindo, Sanyodo, and one province of Nankaido. Its shape is a crescent, with horns toward Asia. A remarkable difference in climate is noted between the eastern and the western halves of Hondo, the former under the influence of the Kuro Shiwo, or gulf stream of the Pacific, being mild and warm; the latter, receiving the cold winds and under the influence of cold currents, having a severer climate. The promontories of Hondo are now dotted with well-equipped lighthouses.

HONDURAS, a republican state of Central America, extending e. and w. from the Caribbean sea to the Pacific ocean, and separating Nicaragua on the s.e. from Guatemala on the n.w. It stretches in n. lat. between 13° 10′ and 16°, and in w. long. between 83° and 89° 45′, containing about 47,068 sq.m., including a portion of the Mosquito territory, and 351,700 inhabitants, most of them wholly or partly of aboriginal blood. The country is generally mountainous, being traversed by the Cordilleras (q.v.), which connect the Andes on the s. with the Sierra Madre on the north. The principal rivers are the Chamelicon, Ulua, Aguan, and Choluteca. An excellent agricultural country, Honduras abounds also in mineral wealth. The minerals are gold, silver, copper, iron, cinnabar, zinc, antimony, tin, platinum, opal, amethysts, asbestos, chalk, limestone, marble, and coal. The soil produces valuable timber, fruit-trees, cotton, sugar, coffee, tobacco, indigo, maize, wheat, potatoes, yams, plantains, bananas, and beans. The foreign trade is carried on chiefly with Great Britain, the United States, and Spain. The annual value of exports, consisting of timber, tobacco, hides, dyestuffs, etc., may be estimated at 1,230,000 dollars, or £246,000. The imports, amounting to 750,000 dollars, or £149,000, consist to the extent of more than one-half of cotton manufactures—the articles next in order being woolens, silks, and wines and spirits. This republic is for administrative purposes divided into the seven departments—Comayagua, Tejucigalpa, Choluteca, Santa Barbara, Gracias, Goro, and Olancho. The revenue amounts to about £97,000. The expenditure has for several years exceeded the revenue, while loans have been raised to construct an interoceanic railway from Port Cortez, on the Atlantic, to the bay of Fonseca, on the Pacific ocean. Of the entire length of 232 m. only 56 m. on the Atlantic side were finished in 1879.

HONDURAS (*ante*). The coast was discovered by Columbus in 1502, and in 1526 the country was invaded and possessed by Cortes, at the head of an army of Europeans and Indians which he brought with him from Mexico. He founded the towns of Trujillo and Puerto Caballos (now Puerto Cortes). Central America soon afterwards fell under the dominion of Spain, Gracias being the seat of government. In 1822 Honduras became a part of the Central American confederation, but asserted its independence in 1839, and for more than twenty years was involved in civil strifes which hindered the development of the country. In 1861 there were attempts at insurrection, instigated by the clergy. These attempts were defeated by president Guardiola, who pardoned all the conspirators and was afterwards assassinated. His successor, Montes, entered into an alliance with San Salvador against Guatemala and Nicaragua, but was defeated in battle, when Medina, one of his own generals, joined the victors and usurped the presidency in 1863. He in turn was deposed in 1872 by Don Celeo Arias, who held the place until Aug., 1875, when Dr. Marco Aurelio Soto was appointed provisional president; and in May of the following year the latter was elected by the unanimous voice of the people as constitutional president for the term of four years. The internecine strifes, and the wars with neighboring republics which preceded his accession to power, had a most disastrous effect upon the country. Industry was prostrated, the schools forsaken, an onerous foreign debt incurred, and the minds of citizens filled

with doubt and apprehension. Since 1876 public confidence has been restored, industry revived, intercourse with other countries extended, highways constructed, bridges erected, and new plans adopted for general education. The public revenue, which under former administrations rarely exceeded $300,000, is now estimated at $800,000 per annum. The population of the country is estimated at 400,000. Tegucigalpa, the capital, has 12,000 inhabitants. The executive power is vested in a president elected for four years, and assisted by a council of state, composed of two ministers appointed by himself, a senator elected by congress, and a judge of the supreme court. The legislature consists of a senate and a chamber of deputies. The judicial power is vested in two chief-justices, one of whom resides at the present, the other at the former capital, and in a district judge for each department. These judges are appointed for life by the government; but the justices of the peace, one for each town, are elected for one year by the municipalities. There is a standing army of 1500 men, and a militia of 20,000. Some years since, a combination of American capitalists was formed to establish a banking, exchange, and commission business at the capital, in order to facilitate commerce between the two countries. A railway from Puerto Cortes, on the Atlantic coast, to San Pedro Susa, a distance of about 90 m., has been constructed. It cost $2,000,000, and it has rolling-stock valued at $500,000. More than 1000 m. of telegraph are in operation in the republic. It was reported not long ago that Honduras and San Salvador were making an arrangement to put all the Central American states into telegraphic communication with each other. There are no official returns of foreign commerce. An extensive fruit-trade is carried on between the Atlantic ports of Honduras and New Orleans, which might be vastly increased by employing steamers instead of sailing-vessels. Fruits are abundant and of exquisite quality in the northern coast-region and adjacent islands. Large numbers of cattle are annually exported to Cuba. Mahogany, tobacco, hides, sarsaparilla, indigo, and other dye-stuffs, are also among the exports. Coarse woolen stuffs and rude utensils for home use are the only articles of manufacture. Bees are numerous and yield large quantities of honey. Fish in great variety inhabit the rivers and lakes and abound on the coasts. Tarantulas, scorpions, and venomous insects of various kinds infest every part of the country. Alligators and lizards are numerous. The rattlesnake and corral are the only venomous serpents. Locusts are often very destructive. The predatory birds are the hawk, the vulture, and the turkey-buzzard. Aquatic birds are numerous. The face of the country is mountainous, the highest elevations being 8,000 ft. above the sea. The rivers are numerous, most of them flowing to the Atlantic. The largest of these rivers is the Ulua, which is navigable for 70 m. for steamers of small draft. The Segovia, which forms a portion of the southern boundary, receives its principal waters from Honduras, and has a course of 350 m. through an unbroken wilderness, over a rocky bed, and is broken by rapids which make navigation impracticable. The soil is extremely fertile, and vegetation is luxuriant. The sugar-cane is indigenous, thriving well at elevations of 4,000 ft. above the sea. Coffee flourishes, and tobacco of the best quality is raised. Pimento, capsicum, and other spices are plentiful. Mahogany and rosewood are found in great abundance, as are also many other valuable cabinet woods. The climate is equable on the highlands, but hot on the Caribbean coast, where miasmatic fevers are common. Mining, once the chief business of the country, is now almost abandoned, on account of the great difficulties in the way of transportation. Silver and gold are abundant, but the mines cannot at present be profitably worked. The wars which ravaged the country for so long a time repelled both immigration and capital. So long as the precious metals can be obtained in great abundance in regions where peace and good government prevail, and where railroads afford the best facilities for transportation, men are not likely to seek them in countries torn by civil war, and where the mule is the only carrying agent. In 1878 the government founded a national college and seminary, both of which are under the direction of American teachers. Schools are to be found in every town and village, and in 1878, 25,000 children were attending them. The religion of the country is Roman Catholic, under the jurisdiction of the bishop of Comayagua. Of the 400,000 inhabitants, 205,000 are mestizos, 184,000 Indians, 5,750 whites (descendants of the early Spanish settlers), and 5,250 negroes.

HONDURAS, Bay of, an inlet of the Caribbean sea, between Yucatan and Guatemala on the w., and Honduras on the south. From the adjacent countries of British Honduras and Yucatan it receives numerous streams, the chief of which is the Balize, and contains several islands. The shore is marked by reefs.

HONDURAS, British. See Balize.

HONE, William, an English author, was b. at Bath, in 1779. He published a number of clever political satires, *Ancient Mysteries Described*, an edition of Strutt's *Sports and Pastimes*, etc.; but is best known by his *Every-Day Book* (1826–27), his *Table Book* (1827–28), and his *Year Book* (1829), three publications which contain much curious and useful information, and which have been more than once imitated. He died at Tottenham in 1842.

HONES, or Whet-Stones, a particular class of stones used for the purpose of sharpening edge-tools, such as knives, scythes, etc. They are usually cut into pieces about a foot in length, and from an inch to two inches thick, and either left square or

rounded, according to their intended uses. The finest kind of hones are those called oil-stones; these are hard, compact, and so very silicious that they readily wear down the hardest steel; they are varieties of slate, derived from the argillaceous schists of the paleozoic period. The best are those brought from Turkey; Bohemia is also celebrated for its hones; and excellent ones are found in Persia, in the Harz mountains, in Styria, in America, Spain, Peru, and in Siberia. In Great Britain several localities yield hone-stones of excellent quality, and none better than the celebrated Water-of-Ayr stone, which is much used for polishing copper-plates, as well as for hones. The Welsh oil-stone or Idwall stone, and the cutler's greenstone, are obtained from Snowdon in Wales; and in the neighborhood of Tavistock the Devonshire oil-stones are procured. The hones used for sharpening scythes, etc., are usually made of coarse-grained sandstone.

HONESDALE, a flourishing borough in the n.e. part of Pennsylvania, U. S., 124 m. n.e. from Harrisburg. It is situated at the confluence of the Lackawaxen and Dyberry creeks, and connected by canal and railway with New York. It is the center of a coal-district. It contains a foundry, tanneries, glass-works, mills, two newspapers, etc. Pop. '70, 2,654.

HONESTY, *Lunaria*, a genus of plants of the natural order *cruciferæ*, of which two species, natives of the s. of Europe, *L. annua* or *biennis* and *L. rediviva*, have long been cultivated in British flower-gardens, partly on account of the beauty of their flowers, and partly of the curious appearance of their large flat seed-pouches (*silicules*). The origin of the English name is doubtful. Some of the older English poets mention the plant as *lunarie*. It was regarded in the days of superstition as possessing extraordinary virtues.

HONEY is secreted by the nectariferous glands of flowers, from whence it is collected by the working or neuter bees, which extract it by means of the proboscis, and pass it into the dilatation of the esophagus, known as the crop or honey-bag. When the animal has arrived at the hive, it disgorges the honey, probably altered by admixture with the secretion of the crop, into the cells of the comb. It is used by the bees as food, but it is its general properties and uses to man that here require notice.

The composition of honey varies somewhat according to the food of the bees, their age, the season, etc. Hybla, a mountain in Sicily, and Hymettus, a mountain in Attica, were in ancient times celebrated for their honey; doubtless in consequence of the wild thyme and other fragrant herbs growing on them. The honey of Narbonne and Chamouni is now held in high estimation for similar reasons; and in this country honey obtained by bees having access to heather has, as is well known, a peculiarly agreeable taste. The substances which have been recognized in honey are sugar of two kinds—one crystallizable and analogous to glucose (q.v.), and the other uncrystallizable, mannite (according to Guibourt); gummy, waxy, coloring and odorous matters; and pollen. The proportion of crystallizable sugar increases with the age of the honey, so as to give it in time a granular character. The best and newest honey is a clear fluid contained in a white comb, while older honey is of a yellowish and even reddish tint.

From the remotest times, honey has been employed as an article of food; and to the ancients, who were unacquainted with sugar, it was of more importance than it now is. "A land flowing with milk and honey" offered the highest conceivable advantages to the eastern mind. Taken in moderate quantity, honey is nutritive and laxative, but dyspeptic persons often find that it aggravates their symptoms. Its therapeutic action is probably not very great, but it is employed with advantage to flavor and give a demulcent character to various drinks or mixtures prescribed for allaying cough; and in the form of *oxymel*, which is usually prepared by mixing honey, acetic acid, and water, it is frequently added to gargles, or mixed with barley-water, so as to form an agreeable cooling drink in febrile and inflammatory affections, or given as an expectorant in coughs and colds.

It should be mentioned that honey occasionally possesses very deleterious properties. Xenophon, in his history of the Retreat of the Ten Thousand (*Anabasis*, book iv.), describes the honey of Trebizond as having produced the effect of temporary madness, or rather drunkenness, on the whole army who ate of it. Mr. Abbot, writing from Trebizond in 1833 to the secretary of the zoological society, observes that he has himself witnessed that the effects of this honey are still precisely the same as those which Xenophon describes, and he adopts the views propounded by Tournefort in 1704, that the poisonous properties are consequent on the bees extracting the honey from the *Azalea Pontica*. Many other instances of poisonous honey are on record.

Honey, although not of so much importance commercially as it was before sugar became so large an importation, is nevertheless brought to this country from abroad in considerable quantities, which, in addition to the home produce mentioned in the article Bee, shows that it is still largely in demand. Nearly fifty tons are annually imported from various parts of the world: North America, the West Indies, Portugal, France, and Greece are the countries from which we receive most. The French is very fine, and is chiefly consumed for domestic and medicinal purposes; the Greek is the finest, and is only used as a table delicacy; most of the other kinds are inferior, and excepting some portion which is used by the tobacco manufacturers, to give a spurious

sweetness to tobacco, it is difficult to account for the consumption of so large a quantity. Honey is often very much adulterated. One of the most common materials used for that purpose is flour; samples of French honey have also been found largely adulterated with gelatine; the latter cannot so easily be detected, as there is always present naturally a portion of gelatine in honey. The quality of even the best depends upon its careful refinement or clarifying. If honey be slightly heated, the chief impurities rise to the surface, and can easily be removed by skimming; this is usually done, except in the case of virgin honey, which is generally sufficiently pure for most purposes.

HONEY ANT, a name given to several species of the ant family, inhabiting Mexico, New Mexico, and Arizona. Like other ants they live in colonies, and most of them have considerable resemblance to our common brown ant. Some of them secrete honey in their abdominal cavities, and become very much swollen, so that they cannot travel. They are then placed in rows in galleries and fed and waited on by the other ants. They become at last apparently spherical distended sacs, the head and thorax having the appearance of a small stem. When food becomes scarce these "stall-fed" ants are eaten by the less-pampered members of the community.

HONEY BUZZARD, or PERN (*pernis*), a genus of *falconidæ*, allied to kites and buzzards, but differing from them, and from all other *falconidæ*, in having the *lore*, or space between the eye and the bill, closely covered with feathers, which overlap one another like scales. The food of honey buzzards consists, not of honey, but chiefly of bees, wasps, and their young, in quest of which these birds dig up the ground, to get at the nests of the insects. They feed also partly on other insects, and less frequently on lizards, small birds, etc. One species (*P. apivorus*) is found in Britain, but is rare; it is rather larger than a common buzzard.

HONEYCOMB MOTH, or WAX MOTH (*galleria*), a genus of small moths of the same tribe with clothes moths, of which some of the species are remarkable for infesting bee-hives. There they deposit their eggs; and the larvæ feed on the honey-comb, through which they make tunnels lined with silk, and in the midst of which they finally spin their cocoons and undergo their transformations. The cocoons are often united in little heaps. These moths, when numerous, are very injurious, and sometimes quite destructive to the bees, from the stings of which they seem to enjoy a perfect immunity. *G. mellonella* or *cereana*, perhaps the most destructive species, is about an inch in extent of wings; *G. alvearia* not much more than half an inch. Both have a satiny appearance, and are amongst the worst enemies the bee-keeper has to encounter.

HONEYCOMBS, in guns, are flaws resembling the cells made by bees, worked in the metal by the action of exploded gunpowder. They spread rapidly, and, with continuous firing, soon eat into the metal to such an extent as to render the further use of the gun dangerous.

HONEY-DEW, a viscid saccharine exudation which is often found in warm dry weather on the leaves and stems of plants, occurring both on trees and herbaceous plants. It is usually but not always associated with the presence of *aphides*, *cocci*, and other insects which feed on the juices of plants, and its flow is ascribed to their punctures; but the rupture of the tissues from any other cause, such as the state of the weather, seems also to produce it, and warm dry weather seems to be necessary for the production in the sap of that superabundance of sugar which is thus thrown off. Aphides themselves exude by certain peculiar organs (see APHIS) drops of a fluid which is called honey-dew, which probably differs considerably from the direct exudation of the plants on which they feed, but mingles with it where they abound. Honey-dew is often so abundant as to fall in drops from one leaf to another on to the ground, sometimes falling from trees even as a copious shower. Different kinds of manna are the dried honey-dew or saccharine exudation of certain plants. See MANNA. But very generally, this exudation, as it dries, coats the surface of leaves and branches with a clammy film, to which everything brought by the atmosphere adheres, and on which molds and other small fungi soon grow, and thus the pores of the plant are clogged and its health is impaired. Gardeners are therefore careful to wash off honey-dew with the syringe. Orange and lemon plantations sometimes suffer great injury from the abundance of honey-dew; and it has proved a cause of very great loss in the coffee-plantations of Ceylon.

HONEY-EATER, or HONEY-SUCKER, a name sometimes given to some of the sun-birds (q.v.), but also the common name of a large family of birds nearly allied to these and to humming-birds, and peculiar to Australia and the islands of that part of the world. This family, *meliphagidæ*—of the order *insessores*, and tribe *tenuirostres*—has a long curved sharp bill, not so slender as in humming-birds and sun-birds; the tongue terminates in a pencil of delicate filaments, the better to adapt it for sucking honey from flowers, or juices from fruits. These are a principal part of the food of the honey-eaters, but they also devour insects in great numbers. They are birds of elegant form, and generally of gay plumage. Most of them have a long and broad tail. They may be observed fluttering and darting among trees and shrubs when in blossom, and are very abundant in all parts of Australia. They are extremely vivacious and active, and keep up a continual chattering. One of the most splendid species, *meliphaga* or *ptiloris para-*

diseus, is called the rifleman or rifle bird by the Australian colonists. Another species, *myzantha melanophrys*, is called the bell bird, because its voice much resembles the tinkling of a little bell. To this family is referred the poe bird, parson bird, or tui-tui (*prosthemodera Novæ-Zeelandiæ*) of New Zealand, a bird larger than a blackbird, and of a deep metallic green color, becoming bronze and black in certain lights, with snow-white tufts of downy curling feathers on the sides of the neck. Unlike most of the *meliphagidæ*, it is a bird of fine song. It has also great powers as a mocking-bird, readily learns to speak many words, and becomes very familiar in domestication.

HONEY-GUIDE, INDICATOR, or MOROC (*indicator*), a genus of birds ranked in the cuckoo family, but differing from the true cuckoos in characters which show an approach to woodpeckers, and also, in some respects, to creepers. They are all natives of Africa, and are found in almost all parts of it. They have acquired their name from guiding men to honey; a curious instinct prompting them to flutter near the traveler with frequent repetitions of a cry which resembles the syllable *cherr;* and it is said that, if followed, they almost always lead to a place where a bees' nest may be found.

HONEY LOCUST TREE, *Gleditschia triacanthos*—also known as the SWEET LOCUST and BLACK LOCUST, and in Britain as the THREE-THORNED ACACIA—a lofty and beautiful tree of the natural order *leguminosæ*, sub-order *cæsalpiniæ*, a native of the valleys of the Alleghanies, and of the basin of the Mississippi. It is not found wild on the Atlantic coast of North America, although often planted for ornament in the vicinity of habitations. The flowers, which are small, greenish, and in spikes, have, when perfect, six stamens and one pistil, but are very generally unisexual. The leaves are twice pinnate, without terminal leaflets, the numerous small leaflets giving a peculiar gracefulness to the foliage, which is of a light shining green. The tree is furnished with numerous sharp triple spines. The pods are long, flat, pendulous, often twisted; the seeds large, brown, and enveloped in a pulp, which, when the pod is ripe, is very sweet. Sugar has been made from it, and, when fermented, it yields an intoxicating beverage, in use among the American Indians. The honey locust attains a height of 70 or 80 feet. Trees of large size are to be seen in some parts of Britain. The wood resembles that of the American locust tree (q.v.), or false acacia (*robinia pseudacacia*), but is more coarse-grained.

HONEY-STONE, or MELLITE, a mineral of remarkable characters and composition, found in connection with coal and sulphur in several places in Germany. It occurs in square octahedrons, looks like a honey-yellow resin, and may be cut with a knife. It is a mellate of alumina, consisting of mellic acid, alumina, and water.

HONEYSUCKLE (*Lonicēra*, or, according to some botanists, *caprifolium*, which others make a sub-genus of *L.*), a genus of plants of the natural order *caprifoliaceæ*. They are shrubs, often twining, and have the flowers either in whorls or in pairs. The calyx is short and 5-toothed; the corolla, tubular-funnel-shaped, 5-cleft, generally two-lipped; the fruit a 3-celled and many-seeded berry.—The COMMON HONEYSUCKLE, or WOODBINE (*L. periclymēnum*), is very abundant in woods and thickets in most parts of Britain. On account of its beautiful cream-colored whorls of flowers and their delicious fragrance, it is often planted in shrubberies, and trained against walls. It is said to be the "twisted eglantine" of Milton. The phenomena observed in its growth have been adduced in proof of a *perceptive power* in plants: the branches shooting out till they become unable to bear their own weight; and then, on their meeting with any other branch, twining around it, from right to left; but if they meet only with one another, twining in different directions, one to the right, and another to the left.—Very similar to this is the PERFOLIATE HONEYSUCKLE (*L. caprifolium*), with paler whorls of flowers, and remarkable for having the upper leaves united so that an opposite pair form one leaf, through the middle of which the stem passes. This peculiarity is confined to the flower-bearing shoots, and does not occur on the young runners; it is also most perfect nearest the flower. This species is a native of the s. of Europe, but now naturalized in many parts of Britain, and much planted, as although less powerfully fragrant than the common honeysuckle, it flowers earlier.—There are numerous other species, natives of Europe, Siberia, and North America.—The FLY HONEYSUCKLE (*L. xylosteum*) is an erect shrub, a native of Europe and Asia, scarcely indigenous in Britain, but common in shrubberies. Its branches are not unfrequently used in some parts of Europe for tubes of tobacco-pipes; and it is said to make good hedges in dry soils. Other erect species are not unfrequently planted in shrubberies.—The TRUMPET HONEYSUCKLE (*L. sempervirens*), called in America the CORAL HONEYSUCKLE, is a native of the southern states of North America, often planted in Britain on account of its beautiful flowers, red on the outside, and scarlet within, which, however, have no fragrance. It is a twining evergreen shrub.—The berries of the honeysuckles are nauseous.—The name honeysuckle is also given to shrubs very different from this genus, but of which the flowers abound in honey, as to species of *banksia* in Australia. *Azalea viscosa* is called swamp honeysuckle in North America.

HONEYSUCKLE, FRENCH. See FRENCH HONEYSUCKLE.

HONEYSUCKLE ORNAMENT, a form characteristic of eastern art. It is used in Assyrian, Persian, and Hindu architecture, and wherever used indicates an eastern

origin. The Greeks borrowed it from the Persians, and, by refining and improving it, made it one of the most beautiful ornaments of their architecture. It is chiefly used in the Ionic style (q.v.). See also GRECIAN ARCHITECTURE.

HONFLEUR, a small t. and seaport of France, in the department of Calvados, is situated on the southern shore of the estuary of the Seine, opposite to and 7 m. distant from the port of Havre. Its situation, backed by wooded heights, is exceedingly pleasing; but it is badly built, dirty, and uninteresting. The commerce of Honfleur, once of some importance, has been absorbed in great measure by Havre; many vessels, however, engaged in the fisheries, are still owned here, and there is a considerable trade in the export of eggs and fruit to England, and in timber. The principal manufactures are hosiery, chemical products, hardware, and refined sugar. There are also rope-walks and ship-building yards. The harbor is furnished with two light-houses. Pop. '72, 8,420.

HONG, the Chinese name for a factory or warehouse kept by foreigners. The word signifies a row or series of shops or rooms. In Canton each block so occupied is known as a "hong," and when about a dozen great traders had the monopoly of the foreign trade they were called "hong merchants."

HONG KONG ("Fragrant Streams"), a British island off the s.e. coast of China, is situated in the estuary of the Chu-Kiang, about 100 m. s.e. of Canton It is 9 m. long, from 2 to 6 broad, and has an area of about 29 sq. miles. The capital, Victoria, is situated in lat. 22° 16½′ n., long. 114° 8½′ east. Pop. '72, 121,985—115,564 of whom were Chinese, 4,931 Europeans and Americans; the remainder, 1490, were Manila men and others of mixed blood. The total public income in 1875 was £186,818; the expenditure, £181,337.

The island is covered to the shore with mountains, the peaks ranging from 1000 to nearly 2,000 ft. high. The mountains consist chiefly of granite, syenite, serpentine, and trap; granite quarries are skillfully worked by the Chinese. In the early years of the colony, when the ground was being broken up for building purposes, European settlers suffered much from febrile and other diseases, and an unenviable reputation for unhealthiness was justly earned. Now, however, in this respect Hong-Kong may compare favorably with any other British possession in the east. For about six months, from May to Oct., the heat is oppressive in the extreme, being accompanied with much rain and damp. During four of the winter months, the weather is cool, dry, bracing, sometimes even cold; but the change from the high and moist temperature of summer to a dry cold is apt to produce dangerous diseases, more especially of the kidneys. The temperature in summer ranges from 83° to 90°, and in winter from 40° to 75°. On the mainland, opposite the northern shore of the island, and separated from it by the harbor, which varies from half a mile to 4 m. in width, is the Kow-loong peninsula, a strip of coast territory and portion of the township of the same name, which was ceded to the British government by the convention of Pekin, Oct. 24, 1861.

Victoria, the capital, is situated on the northern shore of the island, on a small bay surrounded by mountains. It is laid out in magnificent streets and terraces, and has an abundant supply of good water from a large reservoir on the southern side of the island. The harbor is commodious and safe; the roadstead has a depth of from 3 to 7 fathoms, and affords good anchorage. At Aberdeen, on the s. side of the island, and at Kow-loong, there are docks capable of taking in the largest steamers. Between Victoria and Canton and Macao, communication by steam is maintained daily, and since the opening of the Suez canal the same may almost be said of Shanghai, Yokohama, Bombay, Calcutta, and Singapore, so that the magnificent harbor presents a most stirring appearance. In 1875 the total tonnage of vessels entered and cleared amounted to 3,150,200 tons. Here mercantile houses centralize their operations and conduct their money transactions; yet Hong-Kong occupies only a secondary rank in the commerce of China. The bulk of the merchandise from Europe goes direct to the place of its destination, without touching this port; in the same manner, teas and silks pass through Hong-Kong only when it is a port of call for the steamers carrying them. The import trade of Hong-Kong is chiefly in opium, in English cotton and woolen goods, and in metals, in repairing vessels, and in the transfer of passengers. One of the most flourishing of British colonies, Hong-Kong is destined to further extension and importance, and will rise with the gradual increase of the commerce of eastern Asia. A small species of deer is found on the island. Among reptiles there are several species of non-poisonous snakes, one species of the boa which reaches a length of eight or nine feet, and the cobra. Lizards also abound.

In 1843 this island was ceded in perpetuity to her Britannic majesty by the treaty of Nankin, having been occupied as a preliminary measure in 1841. Its affairs are ruled by a governor and legislative council.

HONG-KIANG, or WESTERN RIVER. See SI-KIANG, *ante.*

HONITON, a small market-t. and municipal borough of England, in the co. of Devon, is beautifully situated in a graceful and highly cultivated valley, near the left bank of the Otter, 16 m. n.e. of Exeter. The old church contains a light and elegant oak-screen, erected in 1482 by Courtenay, bishop of Exeter. Honiton has long been

famous for the lace called, from the town in which it is the chief branch of manufacture, "Honiton lace." This lace is made by hand on a *pillow;* its manufacture was introduced into England by the Lollards during the reign of Elizabeth. The vale of Honiton is famous for its butter. Pop. '71, 3,464. Honiton was formerly a parliamentary borough, and returned two members to the house of commons, but it was disfranchised in 1868.

HONOLU'LU, a seaport in lat. 21° 18′ n., and long. 157° 55′ w., on the south-western or leeward coast of Ooahu, one of the Sandwich islands (q.v.), is perhaps the only spot in Polynesia that can fairly claim to be reckoned as an integral part of the world of commerce and civilization. Being the seat of government, as well as the center of trade, it is, in every sense, the metropolis of its own group, which is at once the largest and the most important of all the kindred clusters. But beyond this, its intrinsic advantages, and the absence, or at least the distance, of rivals along the surrounding waters, in any direction, have combined to render it an entrepot between the opposite shores of the Pacific. Besides attracting numbers of whalers for repairs and supplies, Honolulu occupies a most convenient position on each of the three great thoroughfares of its own giant ocean. Though Ooahu, in common with the rest of the chain, is evidently of volcanic formation, yet the reef, which forms the breakwater of the harbor of Honolulu, is of coral formation. The temperature of the town ranges between 67°.9 in Jan., and 83°.2 in Aug.; so that, roughly computed, the annual mean is 75°.55, with a divergence in either direction of only 7°.65. The tropical heat is modified by periodical north-easters. The population, numbering fully 20,000, consists chiefly of natives, the foreign element of it counting about a tenth, and of these a good many are naturalized subjects from the United States of America. Honolulu is visited annually by about 300 vessels of various sizes, many of them being whalers. This mart of traffic has, for seventy years, maintained the unity, and, through the unity, the peace of the once independent and hostile tribes of the Hawaiian archipelago. In Honolulu are to be found consuls from the United States, Chili, Denmark, France, Great Britain, Germany, Russia, Sweden, Italy, Belgium, the Netherlands, Austria, and Peru.

HONOR, ACCEPTANCE FOR, a phrase used in the law of bills of exchange, to denote that a stranger volunteers to accept a bill out of respect to a foreign party issuing the bill to persons in this country, who refuse to accept, in which case the stranger accepting, incurs certain responsibilities.

HONORABLE, RIGHT HONORABLE, AND **MOST HONORABLE;** titles given in the United Kingdom to peers, their families, and persons holding certain public situations. A marquis or marchioness is styled most honorable, a peer (temporal) or peeress of a lower grade, whether by right or by courtesy, is right honorable. The title right honorable is also bestowed on the younger sons of dukes and marquises, and their wives; and on all the daughters of dukes, marquises and earls; and honorable on the younger sons of earls, and all the children of viscounts and barons. Privy councilors, the lords mayor of London, York, and Dublin, the lord advocate of Scotland, and the lord provost of Edinburgh, are also entitled to the prefix right honorable; and maids of honor, lords of session, the supreme judges of England and Ireland, to that of honorable. Members of the house of commons, though honorable is not prefixed to their names, are distinguished as the "honorable member for ——," and the East India company has been held entitled to the same prefix. In America the characteristic love of title has been shown in the practice of attaching honorable to the names of governors of states, judges, members of congress, and other public functionaries.

HONORABLE ORDINARIES, in heraldry. See ORDINARIES.

HONORA'RIUM, a term sometimes used to denote the fees payable to counsel or physicians, because they were presumed to be given as a present, and paid beforehand, and not on the vulgar theory of payment for services rendered. The legal effect which followed was, that neither counsel nor physicians, if not paid their fees beforehand, could bring an action against the client to recover them. This is still the case in the United Kingdom as to counsel, but not as to registered physicians, who can now recover their fees by action. The law as to how far a counsel can validly make a special agreement for a fixed sum, and sue for it, was discussed in the case of Kennedy *v.* Brown. The client cannot sue to recover a fee because of negligence in the counsel.

HONORA'RIUM (*ante*). It would be, perhaps, more precise to say that the *honorarium* was not given as a present, but strictly as a mark of honor, and the amount was not left at the will of the payer, but was rather settled by custom, varying of course with the standing of the employed. According to Braude the *honorarium* was originally applied solely to the salaries of the great officers of state, by way of intimation that they were tendered as a mark of honor.

HONORS, MILITARY AND NAVAL. See SALUTES.

HONORS OF WAR, the term used to express the privileges allowed to a garrison surrendering, either in consideration of a brave defense, or from some other cause. Many degrees of honor may be paid to a vanquished enemy, according to the generosity or judgment of the victorious commander-in-chief. In some cases, the garrison is allowed to march out with all its arms, drums beating, colors flying, etc.; at another time, the

conquered force will only be permitted to advance silently to the front of their works, there to ground or pile arms, and then, facing about, to return to their lines as prisoners of war. Occasionally, the capitulation will provide that the garrison shall deposit their arms and warlike stores at some specified spot, and then march on to their own territory on parole of not serving during the existing war against the victors or their allies.

HONO'RIA, JUSTA GRATA, a daughter of Constantius III., and sister to Valentinian III., b. 418 A.D. in Constantinople; lived at Valentinian's court in Rome. She secretly invited Attila the Hun to marry her, but as he did not entertain the proposition, she sent another invitation, and Attila accepting it, claimed with her a portion of the empire. As Valentinian refused to accede to such a demand, Attila invaded Gaul. Honoria's fate is unknown.

HONORIUS, the name of four popes.—HONORIUS I. has been the subject of much controversy, not alone between Catholics and Protestants, but also between the Gallican and Ultramontane schools of Catholics themselves. He was born of a consular family in Campania. Of his early history little is known, except that he took an active part in bringing to a close the disputes which arose in northern Italy about the controversy of the three chapters (q.v.). On the death of Boniface V. in 625, he was elected bishop of Rome. His general administration of church affairs has been favorably judged by historians; and his name is especially connected with the history of the paschal controversy in Ireland, and with that of the early Anglo-Saxon church. But his pontificate is particularly memorable on account of the monothelistic heresy. See MONOTHELISM. Honorius is connected therewith rather negatively, than by any positive participation, in the dissemination of the monothelite doctrine. While the controversy was yet new in the west, Sergius, patriarch of Constantinople, wrote to Honorius, to explain the monothelistic doctrines in the most favorable light, and to suggest that it would be most desirable to impose silence on both parties, in a dispute which really did not affect the substance of the Catholic doctrine. Honorius, misled, it is alleged, by this statement of Sergius, consented, and even expressed himself in language which would appear to condemn the doctrine of two wills in Christ. The Catholic historians, however, maintain that in thus disclaiming the belief of two wills in Christ, Honorius merely denied the existence in Christ of two discordant or conflicting wills, that is, of a *corrupt and sinful human* will opposed to the divine will. It is not easy, perhaps, to reconcile this with the decree of the sixth general council, in which Honorius is anathematized in company with many others, of whose heterodoxy there can be no doubt. But the defenders of Honorius reply, that although the sixth council certainly does include Honorius in one common condemnation with a group of heretical teachers, yet the explanation appended to the condemnation of the former, viz., that "he had not by the exercise of his apostolic authority extinguished the rising flame of heresy, but, by neglecting it, favored its progress," clearly alludes to the error of judgment described above, by which, although himself personally orthodox, he enjoined silence on the controversy at a time when a more far-sighted ruler would have felt it his duty to interfere by a clear and explicit declaration. On the whole, they maintain that, however Honorius may by his imprudent silence have compromised the interests of orthodoxy, he did not put forth any such dogmatic declaration as can fairly be regarded, whether by Protestants or by Gallicans, as irreconcilable with the strict ultramontane doctrine of infallibility, inasmuch as that doctrine contemplates the pope as "speaking from the apostolic chair." Honorius died in 638. Some letters of his are preserved in Labbe's *Coll. Conciliorum*, vol. iii.

HONO'RIUS, FLAVIUS, second son of Theodosius the great, was b., according to the best authorities, Sept. 9, 384 A.D. On the death of his father, the empire was divided into two parts, Honorius receiving the western half, with Rome as his capital; but being only 10 years old, was put under the guardianship of Stilicho (q.v.), who was all his life the *de facto* ruler of the western empire. Honorius first took up his residence at Milan, where, in 398 A.D., he married Maria, the daughter of Stilicho. The most important events of Honorius's reign were the various treaties concluded with the German tribes who dwelt on the Rhine and upper Danube; the rigorous persecution of paganism in 399; and the devastation of northern Italy by Alaric and his Visigoths in 400–403. Stilicho was then in Germany; but on his return, he speedily cleared the country of the invaders, after totally defeating them at Pollentia (Mar., 403). Another irruption of barbarians, under Rhadagaisus, took place in 405–406, which was again repelled by the powerful arm of Stilicho. Nevertheless, this brave soldier and able minister lost the favor of his weak and worthless master, and was treacherously slain at Ravenna, 408 A.D. Alaric was not slow to take advantage of the opportunity afforded him. In 408 A.D. he invaded Italy, and besieged Rome, which only escaped on payment of a heavy ransom; and in the following year he again besieged and took it, raising Attalus to the imperial purple. The death of the invader in 410 A.D., after having a third time besieged Rome, again freed Italy. A new champion of the falling empire arose in the person of Constantius, who suppressed the rebellions of Constantine, Jovinus, and Sallustius in the northern provinces, and of Heraclian in Africa. He was now appointed the colleague of Honorius in the consulship, and received in marriage the hand of Placidia, sister to Honorius, along with a share in the empire, which he did

not long enjoy, as his death took place a few months after. The Gothic and German tribes had for some time been slowly but steadily encroaching upon the western empire, and Honorius's reign saw Spain, Gaul, and Pannonia, some of the finest provinces, snatched from its grasp. He died Aug. 27, 423. Honorius's character presents few salient points. He was weak and foolish, and, when excited by fear or jealousy, cruel and treacherous, a trait well brought out in his treatment of Stilicho and Constantine.

HONT, a co. in n.w. Hungary, on the Danube; 986 sq.m.; pop. '70, 123,800. The surface is mountainous, and the soil generally fertile, producing grain, hemp, flax, and tobacco. Schemnitz is the most important town.

HONTHEIM, JOHN NICHOLAS VON, was b. at Treves in 1701. He was educated in the Jesuit school of his native city, studied canon law at Louvain under the celebrated Van Espen, and afterwards taught it for 10 years at Treves, of which see he became coadjutor in 1748, with the title of bishop *in partibus infidelium*. He is the author of two voluminous works on the history of Treves, *Historia Trevirensis Diplomatica* (3 vols. fol., 1750), and *Prodromus Hist. Trevirensis* (2 vols. fol. 1757). But his literary career is chiefly memorable for a theological essay, which, although with very mean pretensions to learning, by the novelty and boldness of its views created an immense sensation in the theological world. The title of this work, which was in Latin, and dedicated to pope Clement XIII., is "On the State of the Church, and on the Legitimate Authority of the Roman Pontiff," a work composed with a view to the reunion of Christian sects. The name of the author was for a long time unknown, the work being published under the *nom de plume* of Justinus Febronius (a name said to be taken from that of Hontheim's niece, who was called Justina Febronia), whence the system of church government which the work propounds has been called Febronianism (q.v.). His scheme may be described as a very exaggerated form of Gallicanism, with the democratic element of Congregationalism superadded. The work, immediately after its appearance, was condemned by Clement XIII., as well as by many individual bishops. It drew forth a number of replies, the most important of which are those of Zaccaria (1767) and Ballerini (1768). Pius VI., in 1778, required from Hontheim a retraction of these doctrines. This retraction, however, was modified by a subsequent *Commentary*, published at Frankfort in 1781, to which, at the desire of the pope, cardinal Gerdil replied. Hontheim eventually made full submission to the church. He died in his 90th year, at Montquinten in Luxemburg, Sept. 2, 1790.—See Menzel's *Neuere Geschichte der Deutschen*, xi. 456, and foll.

HONVÉD (land-defenders), the name given in Hungary under the earlier kings to the national champions. With the disappearance of these, the word too disappeared; but in the summer of 1848 it was revived, and applied first to those Hungarian volunteers dispatched to the south against the Servians, and subsequently, when the war with Austria really commenced, to the whole patriotic army. Since the reconstitution of Austrian affairs after 1866, the name honved has been given to the landwehr of the Hungarian portion of the empire.

HOOBLY, a t. of Dharwar (q.v.), in the presidency of Bombay, stands in lat. 15° 20′ n., and long. 75° 13′ east. It contains (1872) 37,961 inhabitants, and is one of the principal cotton marts in that section of India. A good road has been constructed to the Malabar coast, by which the raw cotton of the neighborhood is easily and cheaply transported for shipment.

HOOD, a co. in n. Texas on the Brazos river; 614 sq.m.; pop. '70, 2,585—97 colored. The surface is rough, with some prairie and much forest land. The soil is rich and productive. Comanche peak is one of the physical features; it rises 600 ft. above the Brazos Co. seat, Granburg

HOOD, JOHN BELL, b. Ky., 1831; graduated at West Point, and was on frontier duty until the beginning of the rebellion. He then joined the rebels, and was one of their most active officers, attaining the rank of lieut.gen. He was engaged at Bull Run, Antietam, Gettysburg, and at Chickamauga (where he lost a leg). In 1864 he received the command of Johnston's army in the attempt to intercept Sherman's march to the sea, but in Nov. and Dec. he suffered serious defeats from the union forces under Thomas before Nashville. He was immediately relieved from command and retired to private life.

HOOD, ROBIN, the hero of several old ballads and traditionary stories, which generally represent him as an outlaw and a robber, but of a gallant and generous nature, haunting the depths of Sherwood forest, Nottinghamshire, and of Barnsdale forest, Yorkshire, in an early era of English history, which it has hitherto been customary to fix in the 12th century. The earliest authentic notice of him is in the *Vision of Piers Ploughman*, a poem dating from between 1355 and 1365: "rhymes of Robin Hood and Randolph earl of Chester" are there alluded to. About 1495, Wynkyn de Worde printed a poem of considerable length, entitled *The Lytel Geste of Robyn Hood*—apparently a series of rude popular ballads strung together, being probably a modification of the "rhymes" spoken of in *Piers Ploughman*. Thus we see evidence for a considerable antiquity to the ballads commemorating Robin Hood, a collection of which filled

two little volumes printed by Ritson in 1795. It is also certain that, in the early part of the 16th c., there was a wide-spread celebration of annual rustic sports and masquerades, under the name of the *Robin Hood Games*, in which the deeds of the hero, and of his companions, Little John, Friar Tuck, etc., and of his sylvan mistress, Maid Marian, were represented. These even extended to Scotland, where the Reformers had some difficulty in putting them down. In the ballads and the games alike, Robin was always exhibited as a valiant man out of suits with fortune, giving to the poor much of what he took from the rich, most skillful with the long bow and the quarter-staff, and almost unfailingly victorious in personal encounters with whatsoever opponent.

In addition to these evidences of the existence of such a hero, we must remark that his grave has for ages been pointed to in Kirklees park, Yorkshire, marked by a flat stone on which was carved a flowery cross.

While there could be little doubt that some such predatory outlaw as Robin Hood once existed, and that he was of a character to excite, generally speaking, the affections rather than the reprobation of the people, there was a sad want of documentary evidence regarding him, until the publication of a tract by the Rev. Joseph Hunter in 1852. In this *brochure*, it is, first, shown that one of the ballads represents Robin as going, by the invitation of "Edward our comely king," to meet him at Nottingham; as there accepting service with his majesty; and as accompanying him to court; where, however, becoming sick almost to death with that kind of life, he did not remain above 15 months; after which he retired, and resumed his wonted free and jovial life in the forest. Mr. Hunter then proceeds to show that king Edward II. in 1323 made a progress through the western and midland counties, in the course of which he came (Nov. 9) to Nottingham; that in the exchequer accounts between Mar. and Nov. of the ensuing year, among the names of 24 "porteurs" of the king, to whom wages were paid, occur those of "Robyn and Symon Hod;" and that, finally, at the latter date occurs an entry—"Robyn Hod, heretofore one of the porteurs, because he could no longer work, received as a gift, by command, 5s.;" the name from this time appearing no more. Mr. Hunter likewise ascertained that, at a date six years antecedent to the royal progress above mentioned, the name of "Robertus Hood" is found in the court-rolls of the manor of Wakefield, as that of defender in a suit regarding a small piece of land. The probability therefore is that Robin Hood lived and acted as the ballads represent him only a few years before the era of *Piers Ploughman*, and really passed from wild forest life into the royal service for a brief space—an adventure which might appear as the most incredible attributed to him, if we did not know something of the whimsical and puerile character of Edward II., which was such that he did not disdain occasionally to seek amusement in playing at chuck-farthing with his servants. Mr. Hunter further deemed it likely that Hood was one of the yeomen who joined the discontented barons under the earl of Lancaster, and were ruined by the failure of their enterprise. If so, his life in the forest might be rather a sort of guerrilla warfare than a practice of simple rapine; and hence it might, in some measure, arise that the "gests" of Robin Hood became the subject of so much romantic and affectionate sentiment on the part of the community.

HOOD, SAMUEL (Viscount HOOD), English admiral, was eldest son of the Rev. S. Hood, vicar of Thorncombe, Devonshire, at which place he was b., 1724. At 16, he entered the royal navy, was made lieut. in 1746, and post-capt. in 1756. In 1759, being in command of the *Vestal*, 32 guns, he engaged a French 50-gun ship, which he took after a desperate action of four hours. In 1777 he was made commissioner of Portsmouth dockyard, and next year received a baronetcy. He was then made rear-admiral, was sent to the West Indies to reinforce Rodney, and commanded a division in the engagement with the count De Grasse, April 12, 1782. He was made a peer of Ireland by the title of baron Hood. In 1793 he was made commander-in-chief of the Mediterranean fleet, and took possession of the port of Toulon; but the French republican army, in great force, compelled him to evacuate it, after destroying or carrying away the principal part of the shipping, firing the arsenal and public stores. He then sailed for Corsica, which, after a campaign, he annexed to the crown of Great Britain. In 1796 he was advanced to the rank of a viscount of Great Britain, and made governor of Greenwich hospital. He died at Bath, Jan. 27, 1816.—His younger brother, ALEXANDER HOOD, served as rear-admiral under lord Howe, was second in command at lord Howe's victory of June 1, 1794, obtained a victory over the French fleet in 1795, and was made, in 1796, baron, and in 1801, viscount Bridport. He died in 1814.

HOOD, THOMAS, was b. in London in 1798, and after leaving school was placed in the counting-house of a Russian merchant, but his health failing, he was sent to Dundee. At the age of 17, he returned to London, and engaged himself to learn the art of engraving with his uncle. In 1821 he was offered the post of sub-editor of the *London Magazine*, which he accepted, and at once entered upon its duties and an extensive literary acquaintance. His first separate publication was entitled *Odes and Addresses to Great People*. He published *Whims and Oddities* in 1826, of which a second and third series appeared during the two following years. In 1829 he commenced *The Comic Annual*, and continued it for nine years. He edited *The Gem* for one year, contributing to its pages his striking poem entitled *Eugene Aram's Dream*. In 1831 he went to reside at

Wanstead in Essex, where he wrote his novel of *Tylney Hall;* but pecuniary difficulties supervening, he returned to London in 1835. In 1838 he commenced the publication of *Hood's Own,* to which his portrait was attached. Health failing about this time, he went to reside on the continent, and remained six years. In 1839 he published *Up the Rhine,* the idea of which was taken from *Humphry Clinker.* On his return to England, he became the editor of *The New Monthly Magazine,* and on his withdrawal from its management in 1843, he published *Whimsicalities,* consisting chiefly of his contributions to that serial. In 1844 he started *Hood's Magazine,* and contributed to its pages till within a month of his death. During his last illness, sir Robert Peel conferred on him a pension of £100 a year, which was transferred to his wife. He died on May 3, 1845, and was buried in Kensall Green cemetery. Compare *Memorials of Thomas Hood, Collected, Arranged, and Edited by his Daughter, with a Preface and Notes by his Son* (2 vols. 1860).

Hood takes a high place both as a humorist and as a serious poet. He is great at once in comedy and pathos, and he sometimes curiously mingles and combines both. As a punster, he was supreme: he connects far-separated words and ideas by the most subtle analogies, and sends them loose. Much of his comedy, however, is verbal and shallow, and will be soon forgotten. It is as a poet that Hood will be remembered. His *Eugene Aram's Dream, Song of the Shirt,* and *Bridge of Sighs,* are among the most perfect poems of their kind in the English language.

HOODED SEAL, *Stemmatopus cristatus,* Cuv.; *phoca cristata,* Gmel.; *phoca leonina,* Fabr., an animal inhabiting the coasts of Greenland, and North America as far s. as the United States. They are generally found in the ice islands and floating ice-fields in the open sea, visiting the land in April, May, and June. About 2 in. from the extremity of the upper jaw there is a cartilaginous crest, increasing in height as it passes backwards to the back part of the head, where it is about 7 in. high, having a longitudinal depression in the middle, about an inch deep. This crest is an elongation of the septum of the nose, the true nostrils opening on either side of it. It terminates in a muscular hood covered with fur. The whole apparatus is probably accessory to the organ of smell, and, as the fishermen suppose, serves as a reservoir of air while the animal is under water. The females and young have the organ in a rudimentary state. The hooded seal is polygamous and brings forth its young on the ice. It is quite fierce, and will defend itself when encountered, and the animals often have fierce battles with each other. It has a voice resembling the bark and whine of a dog, and when attacked weeps copious tears. It and the rough seal furnish most of the skins sent to market.

HOOD-MOLDING. See DRIPSTONE.

HOOFS. (See HORNY TISSUES.) The healthy soundness of the horse's foot is mainly preserved by permitting it to grow uninjured by the rasp and knife (see HORSE-SHOEING), whilst its toughness is secured, and undue dryness and evaporation prevented, by smearing daily the crust, sole, and frog with a little glycerine, or a mixture made by melting together a quarter of a pound each of tar, honey, beeswax, and glycerine, with a pound of lard. Softness and brittleness of the hoof, which are fruitful sources of cracks and corns (q.v.), may be remedied by the regular use of such dressings, by placing the feet for several hours daily in thick woolen swabs, kept cool and moist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary band. Cracks, or sand-cracks, as they are termed, mostly occur amongst horses much upon the road, cause lameness, and constitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack, and perfect rest are essential. After the earlier heat and tenderness are removed, a hot iron should be drawn at right angles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the hoof, and a sound growth of horn stimulated by a blister round the coronet. The horse's hoofs are too hard and coarse to be employed for the making of the better class of combs and buttons, for which purpose the hoofs of cattle, to the value of nearly £5,000, are annually imported. They are, however, largely used by manufacturers of prussiate of potash and artificial manures.

HOOFT, PIETER, a Dutch historian and poet, was born at Amsterdam, Mar. 16, 1581, studied at Leyden, and traveled in France, Germany, and Italy. He died at the Hague, May 21, 1647. The chief historical works of Hooft are *Het Leven van Koning Hendrik IV.* (Amst. 1626–1652), and *Nederlandsche Historien* (2 vols. Amst. 1642–1654; most recent edition, 1820–23). The latter of these is still of the greatest value, and is considered one of the classics of Dutch literature. Hooft also translated Tacitus into Dutch. As a poet, his *Minnedigte* have not been surpassed, if even equaled, as specimens of the light Anacreontic muse. His *Letters* were published by Huydecooper in 1738. Hooft has exercised an important influence on the development of the Dutch language.

HOOGLY, a river of Bengal Proper, is formed, in lat. 23° 25′ n., and long. 88° 22′ e., by the junction of the first two offsets of the Ganges, the Bhagrutti and the Jellinghi. From the point in question, the stream, strictly so called, is 125 m. long; the

estuary, as far as Saugor roads, measuring 35 m. more. Of all the channels by which the Ganges reaches the sea, the Hoogly is the most available for navigation. In the dry season, the tide is felt nearly up to Chandernagore, 17 m. above Calcutta. During the s.w. monsoon, the Hoogly is subject to the phenomenon known as "the bore" (q.v.). Up to Calcutta the draught is seldom less than 17 ft.; but the bottom is said to be silting up. At its entrance, too, the Hoogly is much encumbered with shoals.

HOOGLY, an extensive district in the province of Bengal, formerly called Saatgong, between lat. 22° and 23° n., and extending a considerable distance along the right bank of the river Hoogly. It is bounded on the n. by the district of Burdwan, on the s. by Hidjelee, on the e. by the Hoogly, and on the w. by Midnapoor. This district consists of low, flat land, very fertile, but that part which is nearest to the sea is very thinly inhabited; it is called the Sunderbund, is swampy, covered with wood, and remarkably unhealthy. It is intersected in every direction by rivers and their branches, which afford great facilities for internal navigation. Along the shores of the ocean salt of an excellent quality is manufactured for the government. The area is 2,089 sq. miles. The pop. is given at 1,520,840, an amount which, compared with the area, indicates the extraordinary density of 728 to the sq. mile. The French settlement of Chandernagore is situated within the limits of the district, as are also Chinsura, and Serampore, now British possessions, but formerly belonging, the first to the Dutch, and the latter to the Danes. The right of the East India company to the district originated in the treaty concluded with Meer Cossin in 1760.

HOOGLY, a city of Bengal Proper, stands on the right or western bank of the river Hoogly, 27 m. n. of Calcutta, in lat. 22° 54′ n., and long. 88° 22′ e. It is estimated to contain (1871) along with Chinsura (q.v.), 34,761 inhabitants. Here is a college for English and Asiatic literature, which owes its existence mainly to the munificence of a native; it has several schools allied with it. The district of Hoogly, with Howrah, contains 1424 sq.m., and a pop., '71, of 1,488,556.

HOOK, THEODORE EDWARD, a celebrated novelist and dramatic writer, was b. in London, Sept. 22, 1788, and educated at Harrow. In 1805, at the age of 17, he produced an operatic farce called the *Soldier's Return*, which was very successful; and between that year and 1811, he wrote 12 other operatic pieces and farces, all of which were popular at the time. His ready wit, sparkling humor, and wonderful powers of improvisation, made him the delight of society; and having pleased the prince regent by his feats of mimicry, he was appointed (1813) accountant-general and treasurer of the Mauritius, with a salary and allowances amounting to nearly £2,000 a year. These offices he held till 1818, when the discovery of a considerable deficiency in the military chest caused him to be arrested and sent to England, and his effects seized and sold. The peculation, it afterwards appeared, had been committed by his deputy, who destroyed himself. On obtaining his liberty, Hook supported himself by writing for the newspapers and magazines, and on the establishment of the *John Bull*, weekly tory newspaper, in 1820, he was appointed its editor. From his connection with this bold, clever, and, at that time, virulent print, he derived, during its prosperous state, fully £2,000 a year. In Aug., 1823, for his debt to the government, amounting to about £12,000, he was arrested under an exchequer writ, and his property sold. He remained within the rules of the king's bench till May, 1825, when he was released from custody. In 1824 appeared, in 3 vols. 8vo, the first series of his *Sayings and Doings*, which yielded him £2,000. A second series followed in 1825, and a third in 1828, for each of which he received 1000 guineas. Several other three-volumed novels were published by him in rapid succession, such as *Maxwell*, 1830; *Love and Pride*, 1833; *Gilbert Gurney*, which contains a sort of autobiography of himself, 1835; *Jack Brag*, 1837; *Births, Deaths, and Marriages*, 1839; *Gurney Married*, 1839; etc. He died Aug. 24, 1841.

HOOK, Rev. WALTER FARQUHAR, D.D., a son of the Rev. James Hook, dean of Worcester, was, b. at Worcester about the beginning of the century, and educated at Christ Church, Oxford, where he graduated in 1821. After holding some minor preferments in the church, he was appointed vicar of Leeds in 1837, and in 1859, dean of Chichester. In 1856 the bishop of Ripon, on taking leave of the clergy of his diocese, stated that 20 churches had been built in Leeds through the exertions of Dr. Hook, while schoolrooms had been provided for more than 10,000 children. Among his works are *An Ecclesiastical Biography, containing the Lives of Ancient Fathers and Modern Divines* (8 vols. Lond. 1845–52); *A Church Dictionary* (8th ed. 1859), *Sermons Suggested by the Miracles of our Lord and Savior Jesus Christ* (2 vols. 1847); *On the Means of Rendering more Effectual the Education of the People* (10th ed. 1851), and *Lives of the Archbishops of Canterbury*, on which he was working to the last, the eleventh volume, containing the lives of Laud and Juxon, appearing immediately after his death, which took place in Oct., 1875. He was elected a fellow of the royal society in 1862.

HOO'KAH. See PIPE.

HOOKE, NATHANIEL, d. 1763; a native of Ireland: author of a *History of Rome*, embracing the period extending from the foundation of the city to the time of Augustus. It was published in 4 vols. at intervals of 40 years between the appearance of the first and the last. His work possesses the virtues of acuteness and clearness.

In opposition to Middleton, he defended the cause of the plebeians against the patricians. Hooke was a zealous Roman Catholic. When Pope was dying, a priest was brought to hear his confession and grant him absolution. This priest was brought by Hooke. He had been employed and well paid by the duchess of Marlborough for assisting her in writing her memoirs, but he was so zealous in attempting to convert the duchess to Catholicism that a quarrel was the consequence. He was one of the sufferers from the South Sea bubble. Besides his *Roman History*, he wrote *Observations upon the Roman Senate*, in which he advanced and extended the political views propounded in his *History*. He also translated from the French the life of Fénélon, and Ramsay's *Voyages de Cyrus*.

HOOKE, ROBERT, an English natural philosopher, b. at Freshwater, Isle of Wight, July 18, 1635, was educated at Westminster school, and at Christ Church, Oxford. In 1662 he was appointed curator of experiments to the royal society, and in 1677 became its secretary; in 1664 professor of geometry in Gresham college, London; and in 1666 surveyor for the city of London, a most lucrative appointment. He died at Gresham college, Mar. 3, 1703. He was a man of extraordinary inventive genius, and has justly been considered as the greatest of philosophical mechanics; the wonderful sagacity, nay, almost intuition, he showed in deducing correct general laws from meager premises, has never before or since been equaled. There was no important invention by any philosopher of that time which was not in part anticipated by Hooke. His theory of gravitation subsequently formed part of Newton's; he anticipated the invention of the steam-engine, and the discovery of the laws of the constrained motions of planets. Among his own completed discoveries are, the law of the extension and compression of elastic bodies, "*ut tensio sic vis;*" the simplest theory of the arch; the balance-spring of watches and the anchor-escapement clocks; the permanency of the temperature of boiling water. The quadrant, telescope, and microscope are also materially indebted to him.

HOOKER, JOSEPH, 1815–79; b. Mass., graduated at West Point in 1837, and served in the Florida and Mexican wars. At the battle of Monterey, he made himself conspicuous for gallantry, securing the brevet of capt., and when gen. Scott assumed command, Hooker was made assistant adjt.gen. He went through the campaign, from Vera Cruz to the city of Mexico. During the struggle at National Bridge, he so distinguished himself as to gain the brevet of major, and his services at Chapultepec obtained for him another brevet, that of lieut.col. In 1853 he resigned from the army and commenced farming in California. When tidings of the firing on Sumter reached him, he hurried to Washington and offered his services to the government. He was at once commissioned brig.gen. of volunteers, commanding a brigade in the department of Annapolis and subsequently a division. He led several expeditions across the Potomac in the winter of 1861–62, capturing or destroying rebel batteries. In April, 1862, he took command of the 2d division of the 3d corps on the peninsula, and distinguished himself in the siege of Yorktown, May 4; the battle of Williamsburg, May 5, and the succeeding pursuit; Fair Oaks, May 31 and June 1; and during the "seven days' battle," especially at Malvern hill, and became known as "fighting Joe Hooker." He was made maj.gen. for gallantry, his commission dating July 4, 1862, but afterwards dated back by the president to May 5. He also took a prominent part at Bristoe station, the second Bull Run, Chantilly, and South mountain, and at Antietam was wounded. Sept. 20 he was commissioned brig.gen. in the regular army. He commanded a grand division under Burnside in the battle of Fredericksburg, and succeeded him in command of the army of the Potomac, Jan. 26, 1863. In May he fought the battle of Chancellorsville, and June 27 resigned his command, being succeeded by gen. Meade.

In Sept. following he took command of the 12th and 13th army corps near Chattanooga, and took part in the battles in that vicinity in Nov., and commanded in the battle of Lookout mountain, for which he was made brevet maj.gen. Later he commanded the 20th corps, known as the army of the Cumberland, near Atlanta, but resigned this command in Aug., 1864. In Sept., 1864, he took command of the northern department, of the department of the east in 1865, and in 1866 of that of the lakes; and in Sept., 1866, was mustered out of the volunteer service. In 1878 he was made brevet maj.gen. of the regular army, and retired from service. His health was greatly impaired, a paralytic affection disabling him in great degree. He resided much of his time at the hotel in Garden City, L. I., and died there in Mar., 1879.

HOOKER, JOSEPH DALTON, M.D., C.B., F.R.S., was b. at Glasgow in 1816, and is the only surviving son of sir W. J. Hooker (q.v.). He was educated for the medical profession, and graduated as M.D. at Glasgow in 1839. He immediately thereafter renounced the pursuit of medicine for that of botany, and joined the antarctic expedition of the *Erebus* and *Terror*. When he returned in 1843, he brought with him 5,340 species of plants, which, with the discoveries of capt. Cook and other voyages, were published in 6 quarto vols., under the title of *Botany of the Antarctic Voyage* (1847–60). This great work gave him at once an eminent position in science. In 1847, he undertook an expedition to the Himalayas, which occupied him for three years. The large collections made at this time were joined to those of his friend, Dr. Thos. Thomson of the botanic gardens, Calcutta, and numbered in the aggregate nearly 7,000 species. His *Himalayan Journals* (2 vols. 8vo, 1854) contain the narrative of this expedition, and

the *Rhododendrons of the Sikkim-Himalaya* (1849–51) illustrate the most remarkable additions which he made to the ornamental plants of our gardens on this occasion. With Dr. Thomson he undertook a *Flora Indica* (vol. i., 8vo, 1855), the first volume of which, containing only a few orders of plants, remains a fragment. The half of the volume is occupied with a valuable dissertation on botanical geography, a department of the science which has received special attention from Dr. Hooker in his various works. He afterwards again undertook a flora of British India, which was completed in 1874. In 1871 he made an expedition to Morocco, ascended the Great Atlas, the summit of which had never before been reached by a European, and brought back a valuable collection of plants.

Dr. Hooker was appointed assistant-director at Kew gardens in 1855, and on the death of his father in 1865, he succeeded him as director. He was president of the British association in 1868, was appointed companion of the Bath in 1869, and elected president of the royal society in 1873. He became knight commander of the star of India in 1877, and LL.D. of Dublin in 1878.

In the list of scientific memoirs published by the royal society, he is recorded to be the author of 58 independent memoirs, and the joint-author of 18 more. He has prepared a valuable *Students' Flora of the British Islands*, chiefly characterized by the record of the geographical distribution of the species. His great work, which he has undertaken in conjunction with his friend George Bentham, is the *Genera Plantarum*, the first part of which appeared in 1862.

HOOKER, RICHARD, author of the books of Ecclesiastical Polity, and one of the most illustrious of English theologians, was born in the city of Exeter, or its neighborhood, about the year 1554. He was early distinguished for his "quick apprehension of many perplext parts of learning," and attracted the notice of Jewell, bishop of Salisbury, through whose influence he was sent to Oxford about his 15th year. He was placed at Corpus Christi college. He was advanced first to the dignity of scholar, and then of fellow of his college. After about three years' residence in his college as fellow, he entered into sacred orders, and ere long was appointed to preach at St. Paul's Cross. Hither all the power and eloquence of the church found their way in the 16th century. To Hooker, however, the trial of such a public appearance was evidently considerable, according to Walton's account; and the more as the weather proved very unfavorable for his journey; "but a warm bed and rest, and drink proper for a cold, given him by Mrs. Churchman, and her diligent attendance added unto it, enabled him to perform the office of the day, which was on or about the year 1581." Mrs. Churchman's kindness proved too much for the simple-minded theologian. He was led, evidently without due consideration, into a marriage with her daughter. This marriage of Hooker, as is known to all, was far from proving a source of happiness—a result that could scarcely have been expected from its commencement. Walton's description of the visit of his two old pupils, Edwin Sandys and George Cranmer, and "Richard called to rock the cradle" from their company, is among the most characteristic sketches of this fine old writer. The visit was made to Drayton-Beauchamp, in Buckinghamshire, where Hooker had settled in 1584, as a country priest, after his marriage. He was transferred ere long to the mastership of the Temple, by the patronage of archbishop Whitgift; and here he was plunged into the controversy with Puritanism, out of which his great work arose. Travers, one of the most zealous of the Elizabethan Puritans, was his colleague in the Temple. Travers was the more attractive and popular orator, if the less profound thinker. The union was not a happy one. The congregation "ebbed in the forenoon," Fuller tells us, "and flowed in the afternoon." "Pure Canterbury" was in the ascendant in the morning, "Geneva" in the afternoon. Hooker soon tired of the contention in the congregation, and the indifference of the majority to his ministry. He accordingly applied to the archbishop, who presented him, in the year 1591, to the rectory of Boscum, in the diocese of Salisbury, and 6 m. from that city. Here he remained for four years, busily employed with his great work, which his experience in the Temple probably prompted. The first four books of the Ecclesiastical Polity appeared in 1594. In the same year he was transferred to the living of Bishopshorne, near Canterbury, where he spent the few remaining years of his life, and gave to the world the fifth book of the Polity. The remaining three books were posthumous. About the year 1600, in the 46th year of his age, he caught cold in his passage from London to Gravesend, and gradually sunk under the weakness which followed.

Hooker will always be esteemed one of the most illustrious thinkers and writers, not only in English theology, but in English literature. He is alike comprehensive and profound, tranquil and eloquent. He is speculative without mysticism, and earnest without declamation. He searches all the depths and rises to all the heights of his subject, without ever forgetting the simplicity of the Christian or breaking the charm of catholic association that binds all its parts together. More than anything, he is wise and *judicious* in the highest sense of that word; and it is the light of lofty and calm wisdom, shining through his pages, that continues to make them a delightful and excellent study, when most of the contemporary theological works are forgotten.

HOOKER, THOMAS, 1586–1647; b. England; graduated at Cambridge, and was a preacher in London. He was silenced for non-conformity, and then set up a grammar

school in which John Eliot, afterwards known in New England as the "apostle of the Indians," was usher. After preaching in Holland he came, in 1633, to America, and was ordained at Cambridge. Three years afterwards he went with about 100 other colonists to Connecticut, where they settled at Hartford, as it was afterwards called, where he and Samuel Stone were the first ministers. He preached usually without notes, but about 200 of his sermons were reported and sent to England, where half of them were published. His most important literary work was *A Survey of the Sum of Church Discipline*, written in conjunction with John Cotton, and published in England.

HOOKER, Sir WILLIAM JACKSON, F.R.S., a celebrated English botanist, was b. at Norwich in 1785. His first work was a *Journal of a Tour in Iceland* in 1811, which attained such popularity that a second edition was called for in 1813. From that time to his death in 1865, he was almost incessantly engaged in the publication of botanical works. His investigation on the British jungermanniæ and mosses led to his appointment to the chair of botany in the university of Glasgow, where he lectured with great success till 1841, when he resigned his professorship on being chosen director of the royal gardens at Kew, an office which he filled in a most efficient manner. His name was enrolled in the lists of all the scientific societies at home and abroad; and he was knighted in 1836, on account of his high scientific acquirements. The following are some of the most important of his works: 1. *Monograph of the British Jungermanniæ* (1812–16); 2. *Muscologia Britannica*, containing the mosses of Great Britain and Ireland (1818); 3. *Icones Filicum* (in association with Dr. Greville), (2 vols. fol. 1826–37); 4. *The British Flora* (1830), a work that has gone through seven editions; 5. *A Century of Orchidaceous Plants* (4to, 1848); 6. *The Victoria Regia;* 7. *Icones Plantarum* (10 vols. 1837–60); 8. *British Ferns* (1862); 9. *Garden Fern* (1862).

HOOKER, WORTHINGTON, 1806–67; graduated in medicine at Harvard, and practiced in Connecticut until 1852, when he became professor of the theory and practice of medicine in Yale college, and remained there through life. His principal works are *Physician and Patient*, and *Lessons in the History of Modern Delusions.*

HOOKS AND EYES. These small articles are largely used in millinery for dress-fasteners, and are of great utility. Formerly, they were made by hand, the wire of which they are formed being bent into the proper shape by pliers; now, however, they are entirely made by machines of great simplicity and beauty. With a pair of them it is possible to make 200 hooks, and the same number of eyes, in one minute. The operations of the machines are, first, to draw the wire forward from the supplying-reel, then cut off the length required for hook or eye, as the case may be; a sinker then descends and forces it into a slot, by which it is bent, and two projecting cams, acting at the same time on the two ends, bend them over so as to form the lateral loops used for sewing the hook or eye to the garment; then, in the case of the hook, it is passed under another sinker, which forces the double wire into another slot, and forms the hook part; one side of the slot, being movable, is made to strike the bent portion of the hook sufficiently to flatten it. It is then complete, and drops out, to make room for another.

HOOK-SQUID, the name commonly given to cephalopod mollusks of the genera *onychoteuthis* and *enoploteuthis*, allied to the common squids or calamaries (q.v.), but having the eyes destitute of any covering of skin. The arms have two rows of suckers; the tentacles much exceed them in length, and are furnished with hooks at their extremities. Hook-squids are found in the Sargasso sea, in the Polynesian seas, etc. They are much dreaded by swimmers and divers, being often of large size—sometimes 6 ft. long or more—whilst their hooks, their many arms, their very numerous suckers, and their strong, sharp mandibles, entitle them to a place amongst the most formidable monsters of the deep.

HOOP ASH. See NETTLE-TREE.

HOOPER, JOHN, an English prelate and martyr, was b. in Somersetshire about 1495, and educated at Oxford. By the study of the works of the German reformers, and of the Scriptures, he was converted to Protestantism, and about 1540 he went to the continent, and spent some time in Switzerland. At the accession of Edward VI., in 1547, he returned to England, and became a preacher in London. In 1550 he was appointed bishop of Gloucester, but his objections to wearing the episcopal vestments caused some delay in his consecration. In 1552 he received the bishopric of Worcester *in commendam*. On the commencement of Mary's reign, in 1553, he was committed to the Fleet, where he remained for 18 months, being frequently examined before the council; but continuing firm in the Protestant faith he was condemned as a heretic, and burned at the stake at Gloucester, Feb. 9, 1555. He was the author of numerous sermons and controversial treatises.

HOOPER, WILLIAM, 1742–90: b. Boston; graduated at Harvard and studied law in the office of James Otis; removed to North Carolina and practiced with great success. He was a political leader there, a member of the continental congress, and one of the signers of the declaration of independence.

HOOPING-COUGH, or **PERTUSSIS,** is an infectious, and sometimes epidemic disease, mostly attacking children, especially in the spring and autumn. Its earliest

symptoms, which usually appear five or six days after exposure to infection, are those of a common cold, as hoarseness, a watery discharge from the eyes and nose, oppression of the chest, a short, dry cough, and more or less feverishness. This stage, which is called the *catarrhal*, lasts a week or ten days, when the fever remits, and the cough begins to be followed by the peculiar whoop which characterizes the disease, and which is caused by the inspiration of air through the contracted cleft of the glottis. See LARYNX. The disorder may now be regarded as fully developed, and consists of paroxysms of severe coughing, which usually terminate in the expectoration of glairy mucus, or in vomiting. During the fit of coughing, the face becomes red or livid, the eyes project, and the child seizes some person or object near him for support. These paroxysms occur at uncertain intervals, but usually about every two hours, and between them the child returns to his play, takes his food with good appetite, and exhibits little or no sign of illness. The disease reaches its height at about the end of the fourth week, after which the paroxysms diminish in frequency, and the patient shows signs of improvement. The second stage may last from two to eight weeks, and is succeeded by what may be termed the convalescent stage, the duration of which is very variable.

This is one of those diseases which seldom occur more than once in a lifetime; and hence it probably is that, as few children escape it, it is comparatively rarely noticed in adults. Morbid anatomy has failed to throw any direct light upon its special seat. The proportion of deaths to recoveries in cases of hooping-cough has not been satisfactorily determined, but when there is a severe epidemic, the mortality due to this disease is often very great; the deaths, however, in the great majority of cases, occur amongst the poorer classes. This mortality is, in reality, due rather to the bronchitis and pneumonia (or inflammation of the lungs), which are frequent complications of hooping-cough, than to the disease itself.

The treatment of hooping-cough, as long as it is uncomplicated or simple, should not be meddlesome. Nothing that can be prescribed in the early stages will check its natural course, and the object of the physician should be to ward off complications and to conduct the disease safely to its natural termination. The diet should consist of milk and unstimulating farinaceous matters. The bowels should be kept moderately open. If the weather is cold, the child should be kept in the house with the temperature of the room at about 60°. A grain or a grain and a half of ipecacuanha may be given three or four times a day. Slight counter-irritants may also be applied to the surface of the chest; Roche's embrocation, which consists of olive oil, with half its quantity of the oils of cloves and amber, is extensively used for this purpose. Nothing is so serviceable in the last or convalescent stage as change of air, often even when from a pure to a comparatively impure atmosphere; and next to this, the internal use of a solution of binoxide of hydrogen (see HYDROGEN, BINOXIDE OF,) seems most worthy of trial.

HOO'POE, *Upupa*, a genus of birds of the order *insessores*, tribe *tenuirostres*, and family *upupidæ*. To this family are referred also the genera *promerops*, *epimachus* (plume-birds), etc., natives of warm parts of Asia and its islands, Australia, and Africa, some of which are remarkable for magnificence of plumage. In the whole family, the bill is long and slender, the wings of moderate size or short, the legs short, the toes long, and the claws strong and curved. There are among them, however, great diversities, which have led some to divide them into two families, *upupidæ* and *promeropidæ*. The genus promerops and its nearer allies have a close relation to the *meliphagidæ*, which they resemble in partly feeding on the sweet juices of plants, in order to which the tongue is extensile and divided at the tip. The hoopoes, on the other hand, exhibit many points of resemblance to the crow family, with which they are connected by the choughs, and some points of resemblance even to hornbills. The tongue is short, and not extensile. The COMMON HOOPOE (*U. epops*) is an African bird, a summer visitant of most parts of Europe, found also in some parts of Asia; not of frequent occurrence in Britain, although sometimes seen in autumn, very seldom breeding in any part of the island. It is about the size of a missel-thrush; its plumage exhibits a fine mixture of white, buff, and black; and it has a large crest of two parallel rows of feathers. The hoopoe derives its name from its very frequent utterance of a low, soft sound resembling the syllable *hoop*.

HOOPS. See CRINOLINE.

HOORN, a decaying t. and seaport of the Netherlands, in the province of North Holland, is agreeably situated on a bay of the Zuyder Zee, 20 m. n.n.e. of Amsterdam. It was at one time one of the most flourishing towns of its province; but, like all the towns of North Holland situated on the Zuyder Zee, it has greatly fallen off in trade and prosperity. There are at Hoorn extensive markets for butter and cheese, and fishing and commerce are carried on to some extent. Here the large nets for herring-fishing were invented. Pop. 10,000.

HOOSAC TUNNEL. See TUNNEL.

HOP, *Humulus lupulus*, a perennial dioecious plant of the natural order *cannabinaceæ* (q.v.), the only species of its genus. It has long rough twining stems, and stalked 3- to 5-lobed rough leaves, and is a plant of luxuriant growth and abundant foliage. The male

flowers grow in loose branching axillary panicles, and consist of five stamens surrounded by a 5-lobed perianth. The female flowers are in *strobiles*, or cones, with large persistent, concave, entire scales, which enlarge as the fruit ripens. The part of the hop so much used in brewing, and sold under the name of *hops* (q.v.), is the ripened cone of the female plant. Female plants alone, therefore, are cultivated to any considerable extent, it being enough if a few male plants are scattered over a field.

The oil of hops is sedative, anodyne, and narcotic; and hence the value of pillows stuffed with hops in cases of mania, sleeplessness, etc. The bitter principle is not narcotic, but it is tonic. The oil and bitter principle combine to make hops more useful than camomile, gentian, or any other bitter, in the manufacture of beer; and hence the medicinal value of *extra-hopped* or *bitter* beer. The *tannic* acid contained in the strobiles also adds to the value of hops, and particularly as causing the precipitation of vegetable mucilage, and consequently the clearing of beer. The hop is first mentioned by Pliny as one of the garden-plants of the Romans, who, it appears, ate the young shoots as we eat asparagus; and, in fact, many country people in England do the same at the present day. It is a native of Europe and of some parts of Asia, a doubtful native of Britain and of North America. It is more extensively cultivated in the s. of England than in any part of the world, but also to a considerable extent in Germany, France, Flanders, and southern Russia, and now successfully in North America and in Australia and New Zealand.

The cultivation of the hop was introduced into England from Flanders in the time of Henry VIII., but did not become sufficient for the supply of the kingdom till the end of the 17th century. For some time after hops began to be used in brewing, a strong prejudice existed against the innovation; and parliament was petitioned against hops, as "a wicked weed, that would spoil the taste of the drink and endanger the people." Above 60,000 acres are now employed in the cultivation of hops, chiefly in the counties of Kent, Sussex, Worcester, and Hants; the two former counties producing the best hops in the world. Fields of hops are to be seen as far north as Nottinghamshire.

The hop requires a very rich soil, and its growth is promoted by the liberal application both of organic and mineral manures; although excessive manuring is prejudicial. It spreads rapidly underground by its roots, and is not easily extirpated where it has once been introduced. It is generally propagated by layers or cuttings, which usually grow for a year in a nursery before being planted out. In the plantations they are generally placed in groups of three or four, at distances of from six to nine feet. Great care is necessary in fastening the stems to the poles when they begin to shoot, setting up any that may be blown down, etc. The stalks, or *bines*, are taken down from the poles after the hop-picking, and cut and removed, to be used as litter or as manure, for which purposes they are excellent. The fresh bines, which are cut to prevent undue luxuriance in summer, are dried for feeding cattle, and are as good as the best clover hay.

The fiber of the stems is employed to a considerable extent in Sweden in the manufacture of a coarse kind of cloth, which is strong, white, and durable; but the fibers are so difficult of separation that the stems require to be steeped in water for a whole winter.

The hop-plant often suffers very much, and the prospects of the farmer are destroyed by the hop-mildew, and by insect enemies, the worst of which are noticed in subsequent articles. See HOP-FLEA, etc.

HOPE, Sir JAMES, b. Scotland, 1808; entered the British naval service in 1822, and in 1838 was appointed captain. He was in the river Platte expedition in 1844, and during the Crimean war in the Baltic fleet. In 1859 he was in chief command on the Chinese coast, and was knighted for valuable services. In 1870 he became admiral, and in 1878 was placed on the retired list.

HOPE, THOMAS, a distinguished author and patron of art, ancient and modern, was b. in London about 1770. While still a youth, he traveled over a large portion of Europe, Asia, and Africa, and collected many drawings, chiefly of buildings and sculptures. In England he first attracted attention by the splendid decorations which he bestowed on the interior of his mansion in Duchess street, Portland place, London, a description of which appeared in his book on *Household Furniture* in 1805, a work that completely revolutionized the taste of this country. In 1809 he published his *Costume of the Ancients*, the influence of which was undoubtedly very great. His essay on the *Architecture of Theaters*, belonging to the same year, also deserves mention. Three years afterwards appeared his *Modern Costumes*, and in 1819 his *Anastasius, or Memoirs of a Modern Greek at the close of the 18th Century*. This last work is his masterpiece. It was published anonymously, and was said by many people to be a production of lord Byron's, who was greatly flattered by the rumor. It is certainly a brilliant and erudite performance, but is tedious and obscure in many places. It wants the dramatic *vis* of a genuine work of genius, and is now hardly if ever read. The only other works of Hope worth mentioning are his essay *On the Origin and Prospects of Man*, a very heterodox but rather eloquent piece of writing, and a *Historical Essay on Architecture*, both of which were published posthumously. Hope died Feb. 3, 1831.

HOPE, THOMAS CHARLES, 1766–1844; for more than half a century professor of chemistry in Glasgow and Edinburgh universities. He discovered a new earth, which

he named strontites, in a mineral found in the strontian lead-mines in Argyleshire. He made many important investigations. Some of his papers are *On the Point of the Greatest Density of Water; Observations and Experiments on the Colored and Colorable Matters in the Leaves and Flowers of Plants;* and *On the Chemical Nomenclature of Inorganic Compounds.*

HOPE AND COMPANY, a famous banking-house of Amsterdam, started, about the close of the 17th c., by Henry Hope, a Scotchman. The head of the firm at the time of its greatest prosperity was another Henry Hope (1736–1811), b. Boston, Mass., the son of a Scotch royalist. Thomas Hope, the author of *Anastasius*, was also a partner. Another partner, and a remarkable financier, was Peter C. Labouchere, whose marriage with a daughter of sir Francis Baring brought the two great banking-houses into intimate business relations. The Hope house has had heavy transactions with European governments, particularly with Holland and Russia. On one occasion the latter government owed the house $25,000,000. The present head of the firm is Adrian Elias Hope, b. 1845.

HOP-FLEA, *Haltica concinna*, a very small coleopterous insect, not quite one-tenth of an inch in length, which often does much mischief in hop-plantations in spring, devouring the tender tops of the young shoots. It is of the same genus with the turnip-flea (sometimes called turnip-fly), so destructive to turnips.

HOP-FLY, *Aphis humuli*, a species of *aphis* (q.v.) or plant-louse, important on account of the injury which in some seasons it does to hop-plantations. It is, indeed, the principal cause of the great difference between the hop-crop of one year and of another, causing the variations in price and the speculations for which the hop-trade is notable.—The winged female is green, with a black head, and spots and bands of black on the body; the legs are long. A few winged females appear about the end of May, and wingless multitudes are sometimes to be seen by the middle of June, on the under side of the hop-leaves and on the stems. *The fly* is the great dread of hop-cultivators, and no means have been found of arresting its ravages. Lady-birds and other insects render important service by devouring the aphides and restraining their excessive multiplication. It is proposed, in Kirby and Spence's Entomology, that women and children should be employed to pick off the winged aphides on their first appearance.

HOP-FROTH-FLY, or HOP-FROG-FLY, *Amblycephalus interruptus*, a species of froth-fly (q.v.) which sometimes appears in great numbers in hop-grounds, and does considerable mischief. The perfect insect is about a quarter of an inch long, of a yellow color variegated with black. It frequents hedges and grassy places as well as hop-plantations.

HÔPITAL, MICHEL DE L', was b. at Aigueperse, in Auvergne, in 1505, studied law at Toulouse, and first made himself known as an advocate in the parliament of Paris, and after discharging various public functions became chancellor in 1560, during the minority of Francis II. France at this time was torn by contending factions. The Guises, in particular, were powerful, ambitious, and intensely Catholic; and when one of the family, the cardinal de Lorraine, wished to establish the inquisition in the country, Hôpital boldly and firmly opposed him, and may be said to have saved France from that detestable institution. He summoned the states-general, which had not met for 80 years, and, being supported by the mass of moderate Catholics, he forced the Guises to yield. His speech at the opening of the assembly was worthy of his wise and magnanimous spirit: "Let us do away," said he, "with those diabolical words of Lutherans, Huguenots, and papists—names of party and sedition; do not let us change the fair appellation of Christians." He induced the assembly to pass an ordinance abolishing arbitrary taxes, regulating the feudal authority of the nobles, and correcting the abuses of the judicial system. In the following year he secured various benefits for the persecuted Huguenots; but politico-religious passions were too fierce and vindictive in France in those days to be satisfied with anything but blood; and in spite of the most strenuous efforts which Hôpital could make, the nation was plunged in the horrors of civil war, ending rather in the success of the Guises, the political *ultramontanes* of their day. The old patriot, who loved France too well to be either Huguenot or ultramontane, went into retirement, where he heard the news of the massacre of St. Bartholomew, a crime against both the unity of France and the rights of conscience, which broke his heart. He died Mar. 15, 1573.

HOPKINS, a co. in w. Kentucky, on Pond and Tradewater rivers, intersected by the St. Louis and Southwestern and the Paducah and Elizabethtown railroads; 400 sq.m.; pop. '70, 13,827—1869 colored. The surface is uneven and well wooded; soil fertile. Productions: tobacco, corn, pork, etc. Co. seat, Madisonville.

HOPKINS, a co. in n.e. Texas, drained by a branch of the Red river; 750 sq.m.; pop. '70, 12,651—1620 colored. The surface is prairie and woodland. Chief productions: corn, cotton, butter, and wool. Co. seat, Sulphur Springs.

HOPKINS, EDWARD, 1600–57; b. England; a London trader who came to New England in 1637 and settled at Hartford, where he was a magistrate, and governor of the colony every alternate year from 1640 to 1654. Later in life he returned to London, where he died. He left £1000 to support grammar-schools in Hartford and New Haven, and £500 to Harvard college and a school at Cambridge.

HOPKINS, ESEK, 1718–1802; b. R. I.; commissioned as a brig.gen in the revolutionary army, and in 1775 made a commodore and commander-in-chief of the new American navy. He went to sea in Feb., 1776, with four ships and three sloops, and took the forts at New Providence, with all the guns, ammunition, and stores. On his return he seized an English schooner and a bomb-brig. His later operations were less fortunate, and in Jan., 1777, he was dismissed from service for negligence. He was several times chosen to the Rhode Island general assembly.

HOPKINS, EZEKIEL, 1633–90; bishop of Londonderry; b. England. His early education was conducted under Presbyterian and Independent influences—a fact which threatened at first to mar his prospects of church preferment. Upon leaving Oxford, where he had been chaplain of Magdalen college, he was presented to the living of St. Mary Woolnoth, in London. When the great plague broke out in the capital, Hopkins withdrew to Exeter, where he obtained the living of St. Mary's. Here he married Araminta, a daughter of lord Robartes; and when that nobleman was made lord-lieutenant of Ireland, Hopkins went with him to Dublin, and through his influence obtained the deanery of Raphoe. In 1681 he was made bishop of Londonderry. In the famous siege of that town by the Irish adherents of James II., in 1689, Hopkins showed how completely he had outlived the influences of his early training by preaching with the most earnest zeal the doctrines of non-resistance. In the course of the siege he withdrew from the town, and retired first to Raphoe and afterwards to London, where he was made rector of St. Mary Aldermanbury. This charge he held until his death in June, 1690. His works, which have been frequently republished, comprise *Sermons, Expositions of the Decalogue and the Lord's Prayer,* and elaborate discourses on *Regeneration* and *The Vanity of the World.*

HOPKINS, JOHN HENRY, D.C.L., LL.D., 1792–1868; b. Ireland; came to the United States when a child, and received a classical education, and became an iron manufacturer in Pennsylvania. Not succeeding in business, he studied law, and began practice in Pittsburgh, but in 1823 he entered the ministry of the Protestant Episcopal church; in 1826, and again three years later, he was a delegate to a general convention, where he took a prominent part. In 1831 he accepted the charge of Trinity church, Boston, and the next year was chosen bishop of Vermont, taking also the rectorship of a church in Burlington. He took great interest in education, and made heavy pecuniary sacrifices for its promotion. After 1856 he devoted his whole time to the supervision of the diocese. Bishop Hopkins was a prolific writer, leaving nearly 20 published works, among which are *Christianity Vindicated; The Primitive Creed Examined and Explained; The Novelties which Disturb our Peace; History of the Confessional; The American Citizen, his Rights and Duties; A Scriptural, Ecclesiastical, and Historical View of Slavery,* etc. He was prominent in the Pan-Anglican synod in London in 1867.

HOPKINS, JOHNS, 1795–1873; b. Maryland; a member of the society of Friends; made a large fortune in trade; became a bank president and railroad director in Baltimore. He was never married. In 1873 he founded the Hopkins free hospital, an orphanage for colored children, and the splendid Johns Hopkins university, at an aggregate cost of more than $8,000,000. (See BALTIMORE.)

HOPKINS, LEMUEL, 1750–1801; b. Conn. He was a physician in Litchfield and in Hartford. He wrote satirical and political verses, such as *The Guillotine, The Political Greenhouse, The Hypocrite's Hope,* and *The Victim of a Cancer Quack.* He was one of "the Hartford wits" who wrote the *Anarchid* in advocacy of a strong federal constitution.

HOPKINS, MARK, D.D., LL.D.; b. Stockbridge, Mass., Feb. 4, 1802. He graduated at Williams college in 1824, was tutor there for two years, studied medicine, and after receiving his degree of M.D. began practice in New York. In 1830 he returned to the college as professor of moral philosophy and rhetoric, and held this chair till 1836, when he became president. The duties of this office he discharged for 36 years, holding also the professorship of mental and moral philosophy. In 1872 he resigned the presidency, according to a purpose long declared to retire at the age of 70 years; but he still retains the professorship of mental and moral philosophy. He received the degree of D.D. from Dartmouth college in 1837, and of LL.D. from the university of New York in 1857. In the latter year he became president of the American board of foreign missions. As a teacher of mental and moral philosophy he has impressed himself upon his classes, and given a high reputation to the college. In connection with his work he has published *Lectures on Moral Science; The Law of Love, and Love as a Law;* and *An Outline Study of Man.* As early as 1845 he delivered a course of lectures, on the Lowell foundation in Boston, on the Evidences of Christianity, which were published, and are ranked with the most important works of their class, and are used as a text-book in Williams and many other colleges. He has for many years conducted with the senior college class a weekly recitation in the Westminster catechism, which he makes a lecture and discussion with the students of the main truths of natural and revealed religion. He has long been pastor of the college church, and in his personal intercourse with the students has maintained a strong control together with genial relations of friendship. His administration of the college was remarkably successful, and he has been called by prof. A. P.

Peabody, of Harvard university, "the first of living educators." He has been eminent as a preacher and lecturer. His baccalaureate and other occasional discourses have been published, and many of them gathered in book form.

HOPKINS, SAMUEL, D.D., an American clergyman and founder of the Hopkinsian theology, was b. at Waterbury, Conn., Sept. 17, 1721. Having graduated at Yale college in 1741, he studied theology with Jonathan Edwards, and from 1743 to 1769 was settled as pastor of Housatonic, now called Great Barrington, Mass. He then removed to Newport, where he died Dec. 20, 1803. His writings consist of a life of president Edwards, sermons, addresses, a work on the millennium, and a system of theology, republished in Boston, 1852. He is said to be the hero of Mrs. Beecher Stowe's *Minister's Wooing*. He was remarkable for his simplicity, earnestness, and persevering industry, and his peculiar theological doctrines have been a source of controversy for a century.—HOPKINSIANS, those who adopt the theologiaal opinions of Dr. Hopkins, are not a distinct sect, but are pretty numerous in America, in some of the Christian bodies of which the tenets are generally Calvinistic. They hold most of the Calvinistic doctrines, and even in their most extreme form, but they entirely reject the doctrine of imputation, both the imputation of Adam's sin and of Christ's righteousness. The fundamental doctrine of the Hopkinsian system, however, is that all virtue and true holiness consist in *disinterested benevolence*, and that all sin is *selfishness*—the self-love which leads a man to give his first regard even to his own eternal interests being condemned as sinful.

HOPKINS, STEPHEN, LL.D., 1707–85; b. R. I.; a member of the colonial assembly in 1733, and in 1739 chief-justice of common pleas. In 1755 he was governor; in 1754, one of the commissioners to devise a plan for the union of the colonies. He took an early and active part in the movements for independence, and in 1774 was one of the colony's representatives in congress, where he served three terms. His signature to the declaration of independence is remarkable for its tremulous character, which is said to have been the consequence of a nervous affection. In 1765 he commenced a *History of the Planting and Growth of Providence*. Another work, published in London, was *The Rights of the Colonies Examined*.

HOPKINSON, FRANCIS, 1737–91; b. Philadelphia; graduated at the college of that city, of which he was the earliest pupil. He studied law, and after a brief visit to England took up his residence in Bordentown, N. J. In 1776 he was sent as a delegate to the continental congress. He wrote many sharp satires and popular poems, which did good work for the cause of liberty. In 1779 he was appointed judge of admiralty. On the organization of the federal government he was appointed district judge for Pennsylvania. Among his numerous satires the best remembered is *The Battle of the Kegs*. He was one of the signers of the declaration of independence.

HOPKINSON, JOSEPH, LL.D., 1770–1842; son of Francis; graduated at the university of Pennsylvania, and became celebrated as a lawyer. On the impeachment of judge Chase, Hopkinson was chosen for the defense, and his client was readily acquitted. Hopkinson was in congress in 1815–19 and in 1828 judge of the U. S. court. He is best known as the author of the words of *Hail Columbia* (which he wrote for the benefit of a player at a Philadelphia theater), and which were set to music known as *The President's March* and composed by a German.

HOPKINSVILLE, a city in Christian co., Ky., on the St. Louis and South-eastern railroad, 71 m. n.w. of Nashville; pop., 3,136. Among the public edifices are the court-house, seven churches, a state insane asylum, and a number of academies. There are also a number of manufactories in the city.

HOPLOPHORIDÆ. See GLYPTODON.

HOPPER, ISAAC TATEM, b. N. J., 1771; d. N. Y., 1852. His ancestors were of the religious society of Friends, but his grandfather was disowned for choosing a wife from another sect, and so he was not himself a "birthright member," but joined the society when he was 22 years of age. He was distinguished as a boy for his conscientiousness and courage, his fondness for animals, and an indomitable love of fun, which often betrayed itself in practical jokes of a very annoying character, and which in pleasanter ways he manifested even in his mature years. He was but 9 years old when he met an old negro who had been stolen from Africa when a little boy and sold into slavery. He listened to the old man's story with strong emotion, and, young as he was, made a solemn vow to himself that he would always be the friend of oppressed Africans. At 16 years of age he was apprenticed to an uncle in Philadelphia to learn the trade of a tailor. This was the golden age of Quakerism, and he fell under the influence of its most distinguished preachers and members. Even while he was an apprentice he began to be the helper of "slaves unlawfully held in bondage," of whom there were great numbers in Philadelphia. In early manhood he became an active and leading member of the abolition society founded by Franklin, Rush, and others, and in process of time was generally recognized in Philadelphia as the friend and legal adviser of colored people in all their troubles. He was also an overseer of a school for colored children, founded by the celebrated Anthony Benezet, secretary of a society for the employment

of the poor, inspector of a prison, guardian of abused apprentices, and a friend of the insane. In these various forms of philanthropic labor he exhibited such courage, tact, and devotion that he won the confidence of all his associates. In the division of the society of Friends, which occurred in 1827–28, he acted with those who were called "Hicksites," influenced much, no doubt, by his great regard and admiration for Elias Hicks as an earnest anti-slavery preacher; and in 1829 he came to New York and opened a Friends' bookstore. In 1830 business called him to Ireland, and he went with letters of commendation from many of the most eminent citizens of Philadelphia. Matthew Carey wrote to him in terms which he well knew would be the surest passport to popular favor on the other side of the Atlantic. "I have been well acquainted with you," he said, "about 35 years, and I can testify that, during the whole of that time, you have been a perfect pest to our southern neighbors. A southern gentleman could scarcely visit this city without having his slave taken from him by your instrumentality; so that they dread you as they do the devil." His personal resemblance to Napoleon Bonaparte was so striking that it attracted general notice. Joseph Bonaparte, who knew him well, expressed the opinion that if he were to appear in Paris, dressed in the emperor's uniform, nothing could be easier than for him to excite a revolution. Mr. Hopper, naturally enough, was among the first to join the anti-slavery movement organized by Garrison in 1831. His life was often imperiled in his efforts in aid of fugitive slaves; and as for reputation, such was the state of public sentiment in New York from 1831 to 1845 that he was often denounced in public as well as private. Even the society of Friends shrank from defending him. More than once he was called upon to defend himself in the courts, but every attempt to bring him under the grasp of the law failed. In such cases he refused to employ counsel, relying confidently upon his own knowledge of the law and his ability to defend himself. Once, when he was accused, the court, impressed by the gravity of the case, earnestly advised him to engage a lawyer. "Does the court," he asked, "understand the law?" "Yes," replied the judge. "Well, then," said the imperturbable Quaker, "what need have I of counsel? The court understands the law and I understand the facts; is not that enough?" His accusers never dared to bring the case to trial. He visited the court many times, demanding to be tried, and at length the case was dismissed. Bowie-knives and pistols were more than once used by slave-hunters to frighten him, but in vain. During the pro-slavery riots of 1834 a friend advised him to remove the anti-slavery pictures from the window of his store. "Dost thou think," he replied, "I am such a coward as to forsake my principles or conceal them at the bidding of a mob?" When the mob came down the street with discordant yells, he walked out and stood upon the steps. As they stopped before his door, he looked at them with a courage and dignity so impressive that they were utterly abashed. Once he was knocked down in the street and savagely beaten by a slave-hunter's agent, who approached him from behind; but this did not in the least abate his zeal. In 1840 he was appointed treasurer and office agent of the American anti-slavery society. The society of Friends was then under the control of a party opposed to any active hostility to slavery. This party, offended by the criticisms of the *National Anti-Slavery Standard*, for which Mr. Hopper was in no way responsible, arraigned and disowned him for "being concerned in the publication and support of a paper calculated to excite discord and disunity among Friends;" in other but less ambiguous terms, for being an abolitionist. In 1845 the society removed its head-quarters to Boston, which necessitated the retirement of Mr. Hopper from a post which he had filled for five years. He was now almost 70 years old, but full of bodily and mental vigor, and he gave the last years of his life mainly to the service of the New York prison association, in the organization of which he took an influential part. It was mainly through his personal influence indeed that the act of incorporation was secured. For ten years he was the active agent of this society, often visiting the prison at Sing Sing and addressing the prisoners in a way calculated to inspire in them a purpose to lead better lives. He was the friend and counselor of discharged convicts, finding employment for such as manifested a purpose to reform, and trying to keep them out of temptations which they had not the strength to resist. In this field of benevolence his ripe judgment, rare tact, and true sympathy for the unfortunate found ample exercise. The institution for discharged female convicts was named, in his honor, "The Isaac T. Hopper Home," and has been administered from that day to the present by his daughter, Mrs. Gibbons. When he died, widely honored and lamented, the society of Friends offered a place for his remains in their cemetery; but his burial was in Greenwood cemetery, his children remembering that the society had excommunicated him, and deferring to his own express desire. Mr. Hopper was twice married, and 10 of his 16 children survived him. His life, by Mrs. L. Maria Child, was published in 1853.

HOPPIN, Augustus, b. R. I., 1828; graduated at Brown university, 1848. Disliking the legal profession, which he had selected in the first instance, he turned his attention to art and went abroad to study paintings and engravings. Upon his return he devoted himself to drawing and to the illustration of books, in which he has for years attained great popularity. His pictures in *Nothing to Wear*, *Potiphar Papers*, and *The Autocrat of the Breakfast Table* are widely known.

HOPPIN, JAMES MASON, D.D., b. R. I., 1820; graduated at Yale, and took a theological degree at Andover. In 1861 he was made professor of homiletics in Yale college. He was for many years pastor of Crombie-street church, Salem, Mass. Among the works he has published are *Old England, its Art, Scenery, and People; The Office and Work of the Christian Ministry;* and *Notes of a Theological Student.*

HOPS. The produce of the hop-plant (see HOP). The fruit is a little nut, not larger than a grain of mustard-seed, and between its outer shell and the kernel there is a small quantity of a peculiar granular substance called *lupuline*, which also exists as a sort of efflorescence on the surface of the scales themselves; much of the value of the hop depends upon the abundance of this substance. The *lupuline* is not a mere powder, but each grain is a little organized cellular body, of an oval or round form, and, when seen under the microscope, having a reticulated surface. These lupulinic grains have been analyzed by many chemists. The following is the result of the investigations of Payen, Chevallier, and Pelleteau:

Volatile oil (oil of hops)	2.00
Lupuline (the bitter principle)	10.30
Resin	50 to 55.00
Lignin	32.00
Fatty, astringent, and gummy matters; osmazome, malic and carbonic acids, several salts (malate of lime, acetate of ammonia, chloride of potassium, sulphate of potash), etc.	Traces.
	99.30

The first year the bines, or stalks, are weak, and have to be provided with poles. When the bines die down in autumn, they are cut off, and the sticks removed or stacked, and during the winter the ground is forked over and manured. The plants are in perfection the third year, when each requires a pole about 18 or 20 ft. in height, to which the young bines are tied as they grow, with rushes or bast. They, however, soon begin to twine around the poles, and then require no more tying. In the English hop-grounds, the picking begins about the middle of September. This is done by women and children chiefly, some men being necessary to lower the poles and bring the hops within reach. As the hops are picked, they are taken to the *oast*, or hop-kiln, in which they are dried, usually on horizontal screens of hair-cloth, through which the heat of the kiln passes. This operation requires to be performed with great care, as the essential oil is very liable to be volatilized, especially as the hops are frequently kept from year to year. When fully dried, they are carried to the packing-house, and are there pressed into the bags or pockets, and sewed up ready for sale.

The best varieties of the hop are the hill Golding, the East Kent Golding, golden hops, Jones's hops, grape-hops, and Farnham white bine.

The Goldings are the best and richest, and are used for the finest ales. The Joneses are most valued for their habit of short growth, which enables the grower to use shorter poles. The Colegates are very hardy, and can be grown on a poorer soil than the others. The grape-hops are also very hardy, and will do on an indifferent soil; they are also very prolific.

We also receive them of excellent quality from Canada and the United States. Until the year 1862 hops paid an excise duty, and formed an important part in the revenue, although a very variable crop, owing to the serious check it is liable to from insects, fungi, diseases, and the weather. In 1876 the land under hops in England amounted to 69,999 acres, of which nearly 45,000 were in Kent, and most of the remainder in Sussex, Hereford, and Hampshire. The annual exportation of hops is about 40,000 cwt., chiefly to the United States and Australia.

In a carefully conducted experiment, Dr. Ives obtained 14 ounces of lupuline from 6 pounds of hops; and as he was sure that he had not removed it all from the scales and nuts, a fair conclusion was drawn that the lupuline constitutes a sixth of the whole weight of the best hops. Both the bitter taste and the preservative character of hops are supposed to depend entirely upon this material, whether in the form of fully developed lupuline grains, or diffused in an undeveloped state in the structure of the scales. It is, therefore, of the utmost importance not only to encourage the development of the lupuline by good cultivation, but it is equally desirable to make the best use of it when produced. In furtherance of this, many of the principal English brewers now use an ingenious machine made by Mr. Handyside of Derby, which first shakes off and sifts out the lupuline grains, and then separates the nuts or seeds from the scales. The reason for this separation is this: Experience has shown that much of the aromatic principle of the lupuline is dissipated at a boiling heat; therefore only the scales are so treated, whilst the free lupuline is mashed with lukewarm wort, and the nuts, after being crushed, are treated in the same manner, and all are added together when cold. By this means the aroma is fully developed, and a smaller quantity of hops is found to answer fully.

There is a narcotic principle in hops as well as the bitter and tonic, all of which have led to their employment in medicine. Such use is, however, very limited. For the full details of their employment in the process of brewing, see BEER.

HOP-TREE, *Ptelea trifoliata*, an American shrub of the rue family, called also *shrubby trefoil, wafer ash,* and *wingspeed,* growing in rocky places from Pennsylvania to Wisconsin and southward. It usually grows from 6 to 10 ft. in height, but when well trimmed and cultivated sometimes attains a height of 30 ft. or more. Leaves, trifoliate; leaflets, ovate and pointed, and downy when young; flowers, in terminal cymes on new shoots, greenish, small; polygamous—staminate, pistillate, and perfect ones being on the same plant; fruit, 2-celled, 2-seeded, having a broad wing resembling that of the elm (*ptelea.*) The fruit is very bitter, but does not possess the aromatic principle of the hop (*humulus lupulus*). The flowers have a disagreeable odor; the fruit has been used, it is said, in making beer. The bark and root are the parts used in medicine. When dried it has a peculiar, somewhat aromatic smell and a bitter, pungent acrid taste. Dr. Potter considers it, in the form of a tincture, a valuable remedy in dyspepsia and low fevers connected with gastric irritation. The bark as analyzed by Mr. Steer contains an acrid, bitter oleo-resin; starch; albumen; a yellow coloring substance; and salts of lime, potassa, and iron; also the alkaloid *berberin,* probably the tonic principle.

HOR, a mountain of Arabia Petræa, on the confines of Idumæa, and forming part of the mountain of Seir or Edom. It is generally regarded as the modern *Jebel Haroun,* or Mount Aaron, lying midway between the Dead sea and the Elanitic gulf. On the summit of this hill is a tomb venerated by the Mohammedans as the sepulcher of the high-priest Aaron.

HORÆ, or THE HOURS, who in ancient fable had charge of the gates of heaven, and are variously represented. According to Hesiod they watched over the works of men, while an unknown poet claims for them the distribution of time and calls them the children of the year. Probably they were originally three in number, on that account answering to the three periods into which the early Greeks divided their year. And later on, when the day came to be definitely apportioned into 12 hours, the poets sung of an equal number of Horæ as the guardians of those portions of time. As guardians of the seasons with their regular alternations, they soon came to be looked upon as representatives of the moral qualities, and Hesiod immortalized them as presiding over law, justice, and peace, and as diffusing harmony and order among men. Homer allegorically represents them as ministers of Jupiter and rulers of storm and cloud. They attended the goddesses at the Olympic festivals, and showered blessings upon mortals. The Hora of spring is represented in sculpture as attendant upon Venus when she sprang from the foam, and of Proserpine when she returned from the lower regions.

HORA'TIUS FLACCUS, QUINTUS, the renowned Roman satirist and lyrist, was b. at Venusia, in Apulia—in the country now called the *Basilicata,* lately forming part of the kingdom of Naples—on Dec. 8, 65 B.C. His father, who had been born a slave but manumitted before the poet's birth, was a *coactor* (a collector of money for tax-gatherers and bankers), by which employment he had become a proprietor on a modest scale in his native district. Early seeing the genius and promise of his son, he resolved to devote his whole means to his education, and removing to Rome for the purpose, he gave him the culture usually bestowed on the children of the highest classes. Having finished his youthful studies at Rome, he was engaged on higher ones at Athens, when the assassination of Julius Cæsar threw the whole Roman world into confusion, and dragged Horatius himself—in his 21st year—into the civil war which followed. Brutus, coming with Cassius to Greece, made Horatius a tribune, and he served with the republican leaders in that rank until the fatal field of Philippi put an end to their campaign. Brutus and Cassius destroyed themselves. Horatius made his submission, and returned to Rome. With what was left of his patrimony he bought the office of public scribe, and while living by this humble place devoted his energy to literary creation. Thoroughly accomplished in Greek and Roman literature, he set himself to two great tasks—the naturalization in Latin of the Greek lyric spirit, and the perfect development of the old Roman satire. It is his complete artistic success in both objects which has made him one of the most influential writers of the world, and which will secure his fame as long as order or culture exists upon the globe.

Horatius's first known labors were satires and epodes—the epodes being imitations of the Greek satirist Archilochus. But it is probable that he early began to imitate the other Greek lyrists; and it is certain that his first success was derived not from the public but the private circulation of his works. He made the friendship of Virgil, whose rise preceded his own, and of Varius; and Virgil and Varius introduced him to Mæcenas when he was about 26 years old. That great Etruscan noble and friend of Augustus became the good genius of the poet's life. He endowed him—at some period not exactly known, but before 33 B.C.—with a farm near Tivoli, in the Sabine country, established his independence, fostered his fame, sought his intimacy, loved, honored, and encouraged him as much as one man could another. The friendship of Mæcenas led to that of Augustus, and Horatius enjoyed all his life (he died at 57) the consideration of the greatest persons of his time. He shows his gratitude for such favor in many passages of his poems, but he is never servile, and he compliments the emperor himself only on those features of his reign which have tended to secure him the gratitude, or, what was not less needed, the forgiveness, of posterity.

It is impossible, in our brief space, to discuss the vexed question of the chronology of Horatius's poems, or to notice a fiftieth part of what has been written on it. But if we cannot be sure of the chronology of the poems, they give us themselves ample means for judging of the character of the poet. Even his personal appearance is familiarly known to us. He was a little, round, dark-eyed man, prematurely gray-haired, and inclined to corpulence; in dress somewhat slovenly, and apt to be abstracted in his gait and manner. He was kindly, friendly, and honorable—irascible, but easily appeased—of amorous and generally sensual temperament, yet fully sensible of both the dignity and the prudence of moderation. His philosophy was Epicurean, like that of most Roman men of the world of his age; but he had both an eye and a heart for the noble in history and in life, and his most discerning readers cannot but see that there was a latent fund of earnestness and even piety in his nature, to which his poetry never gave full expression. The real key to his genius is to study him as essentially a philosophical wit and moralist, who had an exquisite faculty for lyrical creation, and was a finished artist by dint of practice in it, but who primarily belonged to the philosophical rather than to the poetic class of minds. Some strict modern critics have doubted his being a poet at all, which, since he could produce all the effects of poetry, is plainly nonsense. The latest criticism, however, decidedly tends to place his lyrical works—as imitations of the Greek, and echoes of the natural notes of an earlier and more poetic age—farther below his *Satires* and *Epistles* than it was once customary to rank them. Meanwhile, this neither robs the *Odes* of their value, nor of their charm, nor of their merit. Their value, as representing an older literature which only exists in fragments, is immeasurable. Their charm, as breathing now all the gayety, now all the sadness, of the ancient pagan mind, is irresistible. And their merit, even as imitations, implies a delicacy of insight, a fineness of touch, a power of minute finish, which has been exhibited by very few writers in the whole history of art. They are, indeed, perpetual models of construction, equally valuable to poets of every school, and were not less carefully studied by Wordsworth than by Pope. Great, however, as is the merit of the *Odes*, that of the *Satires* and *Epistles* is still higher. The native Roman satire—an indigenous product of Italy, as Casaubon has irrefragably established—was developed by Horatius into a branch of composition peculiarly his own, and in his own species of which he has never had a rival. He ridicules the follies of the world from the point of view of a man of the world, playing round vice like a picador round a bull; and though his morality does not rise above the level of a prudential moderation abhorrent of extremes, he enforces this with so much soundness, dramatic liveliness, and gay, vivacious humorous wit, that the pulpit has profited by him not less than the author's study, and he has been the favorite of ecclesiastical dignitaries and statesmen, while also being the pocket-companion of men of letters and epigrammatists. The *Epistles* contain the graver element of the *Satires* in still greater perfection, and with the addition of a fine vein of personal emotion and affection, tinged occasionally with the melancholy of advancing life, which, on the whole, makes them the most valuable of Horatius's works.

The literature of Horatius in modern Europe is enormous, and can only be glanced at here in the briefest manner. The *Editio Princeps* appeared at Milan in 1470, in 4to, and was followed by a long line of editions. In modern times, Orelli has taken a leading place as Horatian editor, and since him, Dillenburger has been justly popular; while England has contributed to the subject, among many other works, the valuable *Horatius Restitutus* of Tate, and the sumptuous volume of Dean Milman. Among the English translators of Horatius, in the whole or in part, are found Ben Jonson, Milton, Atterbury, Pope, Warren Hastings, and Cowper, while Pope's *Imitations* occupy a distinguished place of their own. The best known translation of the whole of Horatius in English is that of Francis, but his day is fast going by. Excellent translations have been issued in our own time by Mr. Martin, Mr. Robinson, lord Ravensworth, lord Lytton, and prof. Conington; and a curious but powerful one by prof. Newman, whose theory of translation, however, has led him into frequent oddities and singularities.

HÖR'DÉ, a t. of Prussian Westphalia, on the Emsche, 33 m. s. from Münster, with which it is connected by railway. Near it are productive coal-mines, and the town has recently increased with great rapidity. Nail-making is carried on. Pop. '75, 12,852.

HOR'DEIN, a term that has been applied to a substance that can be extracted from barley, but which is merely a mixture of starch, cellulose, and a little nitrogenous matter of unknown composition.

HOR'DEUM. See BARLEY.

HO'REB. See SINAI.

HOREHOUND. See HOARHOUND, *ante*.

HORGEN, or HORCHEN, a t. in Switzerland, on the lake of Zurich, 7 m. s. of Zurich city; pop. '70, 5,311. The main business is manufacturing of cotton and silk goods and chemicals.

HORICON LAKE, in Dodge co., Wis., extending into Fond du Lac co.; about 15 m. long and 5 m. wide; finding its outlet through Rock river into the Mississippi. It is shallow, and water-plants flourish on its surface.

HORICON, LAKE. See GEORGE, LAKE.

HORITES, descendants of Hori, grandson of Seir, a people who dwelt in and around Mt. Seir before the Canaanites took possession of Palestine. The Scriptures give their genealogy, and say that they were divided into seven tribes. They were smitten by Chedorlaomer and the kings of the east, when they invaded Sodom in the days of Abraham. They were overcome, and perhaps absorbed by the Edomites, who adopted their habits. They lived in dwellings excavated in the sandstone cliffs, and the ruins of their homes, especially in the Petra, are among the most remarkable of ancient remains.

HORIZON, the circular line formed by the apparent meeting of the earth and sky; this, in astronomical phrase, is called the *sensible horizon*. The *rational horizon* is the circle formed by a plane passing through the center of the earth, parallel to the sensible horizon, and produced to meet the heavens.

HORN, CAPE See CAPE HORN, or HOORN.

HORN, a musical instrument, commonly called in this country the French horn; in Italy, corno; in France, cor de chasse. Its form is that of a long tube of brass, with a large bell-shaped ending. For greater convenience the tube is coiled up into four continuous circles, lying side by side, the coils being soldered together, to keep them in their position. It is sounded by means of a mouth-piece, in form like a little hollow cup. The thinner the sheet-brass is, of which the horn is made, the more easily can the sound be produced. The sounds obtained on the horn are the harmonics of the sound of its whole length, a fundamental sound which cannot be produced by the mouth. As those sounds form only a limited scale, the notes awanting are artificially made, by the hand being inserted into the bell, so as to flatten a higher note down to a lower one. These flattened notes are called stuffed notes, as the sound of them is muffled. The horn, in its natural state, can only be played in one key; but by means of crooks, which are added to increase the length of the tube, it can be transposed into any key. When at its greatest length, the horn measures, from the mouth-piece to the end of the bell, 16 feet. The music for the horn is always written in the key of C, with the key of the composition marked at the beginning of each movement; thus, corno in D, etc., guides the performer as to the crooks he must use, in order to play the notes in the key indicated. The stuffed notes on the horn being very defective in quality of sound, in comparison with the great beauty of the open notes, many inventions have been, from time to time, tried to remedy them. The most successful invention is the valve-horn, which is constructed so that the performer can, by means of three valves, lengthen or shorten the tube, so as to produce any note in the chromatic scale, as a harmonic of the length of the tube, and consequently all of the notes are of the same quality of sound, and open notes. The valve-horn is now generally used as a solo instrument with greater effect than the common horn. As an orchestral instrument, the horn is of great importance. There are never less than two horns in an instrumental score, and in many great works four horns are absolutely necessary. The date of the invention of the horn is lost in antiquity.

HORN, GUSTAF CARLSSON, 1592–1657; b. Sweden; educated at Tübingen, and was trained in military science in Holland under prince Maurice. He took service in the army of Sweden in 1624, and participated in all the victories of Gustavus Adolphus, who called him his "right arm." After the battle of Lützen, Horn conducted the successful campaign in the Rhenish provinces, but at the battle of Nördlingen he was captured and detained a prisoner for seven years. When at last he was liberated by exchange, he joined in the campaign against the Danes, and in 1651 was made a field-marshal.

HORN, or HOORNE, PHILIP II. DE MONTMORENCY-NIVELLE, Count of, 1522–68; a Dutch nobleman who was murdered by the duke of Alva. While he was still a boy, his mother married, a second time, John, count of Horn, and, through his influence, Philip was nominated governor of Zutphen by the Spanish king. He also became admiral of the Flemish fleet, and councilor of state. He distinguished himself at St. Quentin and Gravelines. After spending many years in Spain, he returned to his native land, and joined Egmont in resistance to the policy of Philip. He resisted the introduction of the inquisition into Holland. He was tolerant in principle, and on one occasion used his influence in preventing a massacre of Roman Catholics at Tournay. He struggled vainly against the oppressive measures of Philip and of Margaret, regent of the Netherlands. Philip, desiring at last to rid himself of Horn, Egmont, and others of their party, sent the infamous duke of Alva to Holland as his representative. Alva enticed Egmont and Horn into the city of Brussels and had them arrested. They were summarily brought to trial and executed.

HORNBEAM, *Carpinus*, a genus of the natural order *cupuliferæ*; consisting of trees with compact, tough, hard wood; bark almost smooth and of a whitish-gray color, deciduous leaves, and monœcious flowers. The male catkins are cylindrical and sessile, their flowers consist merely of a little scale-like bract and 12 to 24 stamens. The female flowers consist of a germen, crowned with the 4- to 8-toothed border of the perianth, and with two thread-like stigmas, and are placed in loose slender catkins, always two

together, each at the base of a stalked bract, which is three-cleft or three-cornered, and which, when the tree is in fruit, enlarges very much, becomes leafy, and covers the fully ripened nut on one side. The nut has a thick husk, and is small and striated. The COMMON HORNBEAM (*C. betŭlus*), very frequent in the woods of many parts of Europe, is a beautiful tree, attaining a height of 60 to 100 feet. It is seldom, indeed, now seen of such dimensions in Britain; but it seems to have formed a principal part of the ancient forests of some parts of the island. It has elongato-ovate, acuminate, almost triply-serrate leaves. When in fruit, it has very large, deeply 3-partite bracts. It thrives best in a moderately moist and shady situation. Its root descends deep into the ground. The wood is white, very hard, uncommonly strong and tough, and therefore suitable for bearing heavy strains. It is much used by joiners, turners, and wheelwrights. It takes a very fine polish, and, when well stained, might readily be mistaken for ebony. In the earth, or where exposed to the changes of the weather, it is of no great durability. It burns like a candle, and it is one of the best kinds of firewood; it affords an excellent charcoal, and the ashes yield much potash. The young stems, by reason of the dense growth of their twigs, are very suitable for forming live-fences and bowers; and as it bears clipping very well, the hornbeam was often employed to form those live-walls which were formerly so much the fashion in gardens.

HORNBILL, the name of a genus (*buceros*) and of a family (*bucerotidæ*) of birds, to which Cuvier assigned a place in the syndactylous division of the order *insessores*, but which some naturalists rank with crows in the tribe *conirostres*. Their anatomical structure has been found to indicate affinities both with crows and toucans, and the same inference may be drawn from their habits. The species are numerous; they are natives of Africa and the East Indies. They are mostly large birds, some nearly as large as a turkey, the smallest rather smaller than a magpie. They are remarkable for the enormous size of the bill, and for a large bony protuberance with which it is generally surmounted. The bill is curved, broad at the base, compressed towards the tip; the bony protuberance on the upper mandible assumes different forms in different species. They may be described as omnivorous.

HORN'BLENDE, a mineral allied to augite (q.v.), and containing from 40 to 60 per cent of silica, with variable quantities of alumina, lime, oxide of iron, soda, potash, and fluorine. Hornblende is found in granite, syenite, and other igneous rocks which contain quartz or free silica. It is particularly abundant as a constituent of syenite. It is sometimes found in considerable masses, and even in beds of slaty structure (*H. slate*). The variety called COMMON HORNBLENDE is generally green or black, more rarely brown or gray. It contains a pretty large proportion of protoxide of iron; is generally massive, but sometimes crystallizes in oblique four-sided, or in six-sided prisms. The crystallized hornblende is sometimes called *black schorl*, and is capable of being made into ornaments.

HORNBOOK, the primer or apparatus for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black-letter or in Roman, with perhaps a small regiment of monosyllables. Then followed a form of exorcism and the Lord's prayer, and, as a finale, the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front—hence the name of *horn*-book. There was a handle to hold it by, and usually this handle had a hole for a string, whereby the apparatus was slung to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn. At first, the leaf was of vellum, with the characters in writing; latterly, of paper, and printed. The hornbook was prefaced and otherwise ornamented with figures of the cross, and hence came to be often called Christ cross row, or Criss cross row. Common as hornbooks at one time were, copies of them are now exceedingly rare. One, found some years ago in pulling down an old farmhouse at Middleton, in Derbyshire, had a portrait of king Charles I. in armor on horseback upon the reverse, affording us an approximation to the date. In *Notices of Fugitive Tracts*, printed for the Percy society (1849), Mr. Halliwell figures a more perfect specimen, which he assigns to the time of Elizabeth. Allusions to the hornbook abound in the older writers; Shenstone, e.g., in *The Schoolmistress*, tells us of the children, how

> Their books of stature small they take in hand,
> Which with pellucid horn secured are,
> To save from fingers wet the letters fair.

HORN'CASTLE, a market-t. of England, in the county of Lincoln, is situated in an agreeable district at the foot of the Wolds, 20 m. e. of Lincoln. The parish church is the most interesting of the public buildings; portions of it were erected during the reign of Henry VII. There is a considerable trade here in corn and wool; and of the three annual fairs, that held in Aug. lasts for ten days, and is one of the largest horse-fairs in Britain. There are at Horncastle remains of a Roman fortification; coins and other antiquities are occasionally found in the neighborhood. Pop. '71, 4,865.

HORNE, GEORGE, 1730–92; b. England; educated in the school of Maidstone, whence he passed to university college, Oxford. He afterwards became a fellow, and finally principal, of Magdalen college. In 1771 he was chosen chaplain in ordinary to

the king, and held that office for ten years. In 1776 he became vice-chancellor of the university; five years later he was made dean of Canterbury; and in 1790 was promoted to the see of Norwich, which he retained till his death. Bishop Horne's only important work, his *Commentary on the Psalms*, exhibits a deep acquaintance with Hebrew and biblical lore, and is marked by a spirit of earnest piety. It has been frequently reprinted. His other works, for the most part fugitive pieces of a controversial character, are now forgotten. The best of them were written to defend the views of Hutchinson in opposition to those of sir Isaac Newton, which latter, until he understood them thoroughly, he at first believed at variance with Scripture and subversive of its teachings.

HORNE, Richard Henry, b. London, 1803; receiving a military education, served in the first instance as a midshipman in the Mexican navy until the conclusion of the war of independence. Then returning to England, he devoted himself to literature and wrote several tragedies, many of them with ironical and sarcastic meanings. In one of his books, *Orion, an Epic Poem*, he announced on the title-page that the price was one farthing, in allusion to the public depreciation of epic poetry. This satire obtained a ready sale and went through three editions, each of which increased it in price. Tiring of English life, Horne went to Australia; and afterwards published *Australian Facts and Principles*. He is a prolific writer and contributor to many of the periodicals.

HORNE, Rev. Thomas Hartwell, d.d., an English biblical critic, b. Oct. 20, 1780, was educated at Christ's hospital, and afterwards became clerk to a barrister. His leisure hours were devoted to the study of the Bible, and in 1818 he published his *Introduction to the Critical Study and Knowledge of the Holy Scriptures*, a work which procured for him admission into orders without the usual preliminaries. Subsequently St. John's college, Cambridge, granted him the degree of b.d., and two American colleges that of d.d. In 1833 he obtained the rectory of St. Edmund the King and St. Nicholas Acons, London. He was also made a prebendary of St. Paul's cathedral. In the course of a long life, Horne published a great variety of works, but the one already mentioned is the principal. From the first moment of its appearance, it not only became popular, but attained the dignity of being considered the text-book on the subject in all or almost all the theological colleges of Great Britain and America. It has gone through eleven or twelve editions, and has been frequently improved, so that it still retains the high reputation which it originally bore. He died Feb., 1862.

HORNED FROG, or Horned Toad, a lizard of the genus *phrynozoma*. It has some resemblance to a toad or a frog, but is not a batrachian, but a saurian. The genus comprises about a half-dozen species, all North American, the best known of which are *P. Douglassii*, *P. Blainvillii*, and *P. cornutum*. Capt. Stansbury's *Expedition to the Great Salt Lake* contains full descriptions of them by Messrs. Baird and Girard. The name horned frog has also been given to a batrachian of the genus *ceratophrys*, which has a spiny head. It is a native of tropical South America, and is three or four times as large as a common frog, and feeds upon other frogs, small birds, rodents, and mollusks.

HORNED POUT. See Catfish.

HORNELLSVILLE, a village in the t. of the same name in Steuben co., N. Y., on the New York, Lake Erie, and Western railroad, and on Canisteo river, 60 m. s. of Rochester; pop. of township, 8,879. The village has six churches, a convent, a public library, four newspapers, a free academy, a business college, and many manufactories.

HORNER, Francis, 1778–1817; b. Scotland; educated at the Edinburgh university, and started in the practice of law. He contributed in early life to the *Edinburgh Review* some very able papers. In 1806 he was elected a member of parliament, and siding with the whigs became renowned in debate on questions of finance and political economy. He was in favor of free trade and metallic currency. He took a leading part in the great bullion question, and drew up the first report on the subject. It was mainly due to his influence that restrictions were placed upon the issue of paper money. In private life his character stood extremely high. Sidney Smith said of him: "The commandments were written on his face, and I have often told him that there was not a crime he might not commit with impunity, as no judge or jury who saw him would give the smallest degree of credit to any evidence against him; there was in his look a calm, settled love of all that was good and honorable, an air of wisdom and sweetness; you saw at once that he was a great man, whom nature had intended for a leader of human beings; you ranged yourself willingly under his banner, and cheerfully submitted to his sway."

HORNER, William Edmonds, 1793–1853; b. Va.; graduated at the university of Pennsylvania, and became a surgeon in the U. S. navy. He subsequently practiced medicine in Philadelphia with great success. He was prosector and demonstrator of anatomy in the university of Pennsylvania, and adjunct professor of anatomy in 1819, and full professor in 1831. In 1847 he founded St. Joseph's hospital. In 1824 he announced the discovery of the muscle known as "Horner's muscle." He published a number of medical works, including *Pathological Anatomy; Practical Anatomy; Special Anatomy and Histology; The United States Dissector;* and an *Anatomical Atlas*.

HORNET, *Vespa crabro*, the largest species of wasp found in Britain. It is not uncommon in some parts of England, but is not found in Scotland. The thorax is

mostly black, the fore-part rufous; the abdomen is yellow, with three brown points on each segment. The sting is very painful. The hornet is a very voracious insect, seizing and devouring bees and other insects, and carrying them to its nest to feed its young. The nest is in a hollow tree, in an outhouse, or in some other sheltered place. The community is not supposed ever to contain more than about 200 individuals, all deriving their origin from a single female, which, having survived the winter in some sheltered hiding-place, lays the foundation of the nest in spring. The nest is a curious structure, of a substance resembling coarse paper, and, except as to size, pretty similar to that of the common wasp. The community consists of females, males, and neuters or workers, as in the case of bees, but there are numerous females. Most of the males and neuters perish on the approach of winter, some of the females alone surviving.

HORNING, LETTERS OF, a writ in Scotch law, which issues to compel a party to execute or carry out a judgment or decree of the court. The writ was formerly the only form of enforcing civil decrees by imprisonment, except in the case of small debt decrees. But by recent improvements the process is shortened, and other forms are more used.

HORNITOS, or HORNOS (Span. *ovens*), the name given to the low oven-shaped hillocks which emit smoke and vapors, and which occur in great numbers on the sides and in the neighborhood of the large volcanoes of South America.

HORN MANUFACTURES. The horns of various animals are employed for useful and ornamental purposes. The principal are those of the ox, buffalo, and two or three species of deer, and of sheep and goats. Horn can be softened and split into thin laminæ, or pressed into molds; and as it recovers its peculiar character of flexibility, toughness, and transparency, when cold, it is particularly adapted for a great variety of purposes. It can also be dyed various colors. Solution of gold in aqua regia dyes it red; solution of nitrate of silver in nitric acid, black; a paste of red lead, made with a solution of potash, colors it brown: so that, with a proper arrangement and application of these materials, the most admirable imitations of the much more costly tortoise-shell can be produced. The more common vegetable dye-stuffs, as logwood, Brazil-wood, barwood, saffron, indigo, etc., will also color it, but neither so permanently nor so brightly as the metallic materials. By long-continued soaking, the horns of all the animals above mentioned, except the deer, can be softened, and those of the sheep and goat can be easily split into several layers when they have been soaked and boiled; and these layers cannot only be flattened out by putting them between smooth iron plates heated and placed in a press, but if the edges of two or more are brought together between polished copper plates, and these tightly screwed together with a hand-vise, and plunged for some time in boiling water, and then into cold water, the edges will be found firmly welded together, and the same property enables the horn-worker to use up the smallest cuttings with profit. Another valuable property of horn is that when heated it can be pressed into a die, and not only takes a beautifully sharp impression, but if left in the die until cold it retains it. In this way, then, it is employed in making handles for umbrellas, knives, forks, etc., even ornamental boxes, and a variety of other articles. Combs are made out of the flattened sheets, and beautiful carvings are made out of the solid parts of the buffalo-horns brought in such vast numbers from the East Indies. Ox-horns, too, are sometimes of fine quality and color, and are fashioned into drinking-cups and other articles, often highly ornamental. Deer-horns, which, strictly speaking, are bone, have a very limited application; they are employed in this country for making knife-handles, called buck-horn, in much favor for pocket-knives; but on the continent the horns of the fallow-deer are extensively used in making the deer-horn articles of furniture peculiar to Germany. The deer-horns used in Great Britain are chiefly those of the axis (*axis maculata*), of which at least 100,000 are annually imported from the East Indies. From the same country are brought to Britain 800 tons of buffalo-horns, whilst from South America and other parts the importation of ox and cow horns exceeds a million annually.

HORNPIPE, a musical instrument, consisting of the common wooden pipe with the necessary holes for producing the notes, and with a horn on each end. The performer blows into one of the horns, and the sounds of the pipe proceed out of the other. In the n.w. of England, where this instrument is mostly found, it is used to accompany a national dance which is also called the hornpipe. The melody of this dance is always in triple time—that is, in $\frac{3}{2}$ or $\frac{3}{4}$, and sometimes in $\frac{3}{8}$ time—and it consists of two parts of four or eight bars each, with repeats. The movement of the dance is tolerably quick.

HORNS are appendages to the frontal bones of many of the extensive family of ruminants, and are obviously intended as weapons of defense. In the genus *cervus* (deer) the horns (known also as antlers) are solid, uncovered by epidermis, bone-like in composition, and deciduous. In the genus *camelopardalis* (the giraffes) we have the single example of solid persistent horns completely invested with a hairy integument. In the other horn-bearing ruminants—as the ox, sheep, goat, and antelope—the horns are hollow, uncovered by epidermis, are composed of a special tissue (Horny Tissues, q.v.) quite different from bone, and are persistent. In all these cases the horns are attached to the cranial bones; and in all the hollow horns, excepting those of the ante-

lope, the osseous axis is hollowed out into cells communicating with the frontal sinuses, and thus admitting the atmospheric air into the interior. The horn of the rhinoceros is quite distinct in character from the horns in any of the ruminants. It is a tegumentary, not an osseous appendage, and is usually described as if it were a mass of hairs which had coalesced. It consists, however, in reality of an aggregation of tubes, round which which the horny matter is arranged in concentric laminæ, as in the horny excrescences on the inner surface of the leg of the horse. The first and the third variety—viz., the antlers of the *cervidæ* and the hollow horns of the ox, etc.—alone require special notice.

The deciduous horns of the *cervidæ* at different ages, and their process of growth, are explained in the article DEER. To that description it need only be added that these horns are formed on two well-marked morphological types—one group possessing rounded antlers, such as occur in the roebuck and the red-deer, and the other having the antlers more or less flattened, as in the elk and fallow-deer. A remarkable sympathy exists between the generative organs and the horns; and the development of the latter may be arrested and their periodical shedding may be prevented by castration. As a general rule, it is only in the male *cervidæ* that horns are developed. In the reindeer, however, they are common both to the male and female.

In the hollow-horned ruminants, the bony protuberances or "cores" arising from the frontal bones, and supporting the horns, instead of branching like antlers, form more or less solid cylindrical shafts, the surface being protected by ordinary periosteum (q.v.), and by an extension of true skin, which becomes developed into a dense horny sheath.

The horns of ruminants are almost invariably two in number, but exceptions occur in the case of the extinct bramatherium and sivatherium, and amongst living species, in the four-horned goat, the many-horned sheep, etc. In the prong-horn antelope there seems to be an approach to the cervine type, there being a prong of some length about half-way up the horn, which may be regarded as analogous to the brow-antler.

HORN-WORK, in fortification, is a work having one front only, thrown out beyond the glacis of a fortress; with a view, 1. To strengthen a weak salient in the general outline; 2. To occupy a plateau in advance of the place, or to protect buildings, the including of which in the original enceinte would have extended it to an inconvenient degree; 3. To occupy a tongue of land protected on its sides; 4. To bar a defile; 5. To cover the head of a bridge; 6. To occupy rising ground, the possession of which would render the enemy more than necessarily dangerous. The front of a horn-work consists of two demi-bastions connected by a curtain, and usually defended in front, as in the fortress itself, by tenaille, ravelin, and covert-way. The flanks, protected by ditches, run straight upon the ravelin, bastion, or curtain of the main defenses, so that the ditch may be swept by the fire of the latter. The flanks should not be too long for easy musketry range.

In most of the earlier works of this nature, the ditch of the horn-work was united with the ditch of the main works by being cut through the glacis and covert-way, but in modern works the horn-work is constructed entirely beyond the glacis.

Occasionally, horn-works are very useful; but modern engineers generally prefer constructing detached and advanced works. A double horn-work becomes a *crown-work* (q.v.).

HORNY TISSUES were formerly regarded as extremely simple in their structure, and as being only different forms of a substance to which the term *keratin* (from *kĕras*, a horn) was applied. Recent investigations, however, show that the parts which consist of horny tissue—as, for example, the persistent horns of the ruminants, the epidermis, the nails, claws, and hoofs, whalebone, tortoise-shell, etc.—have a somewhat complicated, and, in some respects, a variable structure, although they are so far analogous to one another that they proceed from nucleated cells which are not morphologically developed like the cells of most other organs, but which, to a certain extent, dry up and are only agglutinated together by an intercellular substance. In a chemical point of view, they also closely resemble one another, for when compared with other tissues they all contain a large quantity of sulphur, in combination with a substance whose origin from or affinity with the proteine bodies (q.v.) is sufficiently obvious from their behavior towards certain re-agents (the caustic alkalies and the mineral and acetic acids, for example), and their percentage composition.

If a section of horn is examined in its natural state, it appears to consist of numberless bundles of fine threads lying side by side. After the addition of potash solution, these bundles are seen to unfold into little plates, which gradually expand into regular nucleated cells.

The cellular structure of hoofs, whalebone, tortoise-shell, etc., may be exhibited in a similar manner. It is to the histo-chemical investigations of Mulder and Donders that we are mainly indebted for our knowledge of the structure of these tissues, who seem to have established that every horny tissue contains at least three different kinds of substances—viz., 1. The substance of the cell-membranes, which is exceedingly difficult of solution in alkalies, and which forms the principal part of the tissue; 2. The cell-contents, which dissolve more readily in alkalies; and 3. A connecting or true intercellular substance.

These tissues have been submitted to ultimate analysis, after having been previously digested in water, alcohol, and ether. The analogy of their composition is shown in the following tabular view:

	Hair.	Horse's Hoof.	Cow's Horn.	Nails.	Epidermis.	Whalebone.	Tortoise-shell.
Carbon.....	50.65	51.41	51.03	51.09	50.28	51.86	51.89
Hydrogen....	6.36	6.96	6.80	6.82	6.76	6.87	6.56
Nitrogen.....	17.14	17.46	16.24	16.90	17.21	15.70	16.77
Oxygen.....	20.85	19.94	22.51	22.39	25.01	21.97	19.56
Sulphur.....	5.00	4.23	3.42	2.80	0.74	3.60	2.22

These tissues differ slightly in the quantity of inorganic matter which they contain, but the difference does not vary much beyond 1 per cent.

Hair yields from 0.54 to 1.85 per cent of ash, containing, amongst other ingredients, peroxide of iron and a little silica. In feathers, the quantity of silica is very considerable, and it is doubtless to this constituent that the shaft in a great measure owes its strength and hardness.

HORODEN'KA, a t. of the Austrian empire, in the province of east Galicia, on an affluent of the Dniester, 106 m. s.e. from Lemberg. Pop. '69, 10,000.

HOROL'OGY (Gr. *hora,* a defined portion of time) is that branch of applied science that has for its object the measurement of time. Although it is easy to look back on a period when time, according to the modern conception of it, as measured by hours, and minutes, and seconds, was unknown, yet we find progress early made in the measurement of larger periods of time, by observations of the heavenly bodies; and although, in the later progress of astronomy, it is found that the movements of the more conspicuous heavenly bodies do not afford accurate marks for the equable measurement of time, they were, for practical objects, sufficient, and afforded at least a better measure of time than any other phenomena which came under the observation of mankind. Thus, time was early divided into years, according to the motion of the sun among the constellations; into months, according to the motion of the moon relatively to the sun's place in the heavens; and into days, by the alternate light and darkness caused by the rising and setting of the sun. It was long, however, before any accurate measure was found for a division of the day itself. The earliest measure employed for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sun-dial (see DIAL). Another means early adopted for the measurement of short periods of time was by the quantity of water discharged by dropping from one vessel into another. Instruments for the measurement of time on this principle were called clepsydræ (q.v.). The running of fine sand from one vessel into another was found to afford a still more certain measure, and hence the invention of the hour-glass (q.v.). King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle. It is not very easy to trace to its source the history of the invention to which the modern clock owes its parentage; the earliest, however, of which we have a complete description, and perhaps the earliest which attained any distinct superiority to the rude machines already mentioned, was the clock of Henry Vic or De Wyck, a German, erected in the tower of the palace of Charles V., king of France, in 1379. A sketch of this clock, which is subjoined, will be useful not only from its historical interest, but also because, from its comparative simplicity, it will form a ground-work for further explanation of the mechanism of clocks and watches in their more complicated forms. It will be readily understood, from a glance at the annexed figure, that as the weight A tends to uncoil the cord and set in motion the cylinder B round its axis, the motion will be successively communicated to the various toothed wheels in the figure, and finally to the crown-wheel or escapement-wheel, I; the teeth of which so act on the two small levers or pallets, *i*, *h*, projecting from and forming part of the suspended upright spindle or vertical axis, KM, on which is fixed the regulator or balance, LL, that an alternating or vibratory, instead of a circular, motion of the balance itself is the result. The hands of the clock are attached to the wheel N, also set in motion by the cylinder B. Now, unless there were some check upon the motion, it is manifest that the heavy weight A would go rapidly to the ground, causing the wheels to rotate, the balance to vibrate, and the hands to go round with increasing velocity. In order to prevent this rapid unwinding of the clock-work, and adjust it to the more deliberate measurement of time,

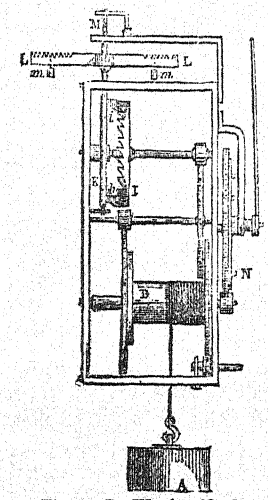


Fig. 1.—De Wyck s Clock.

the balance is, in De Wyck's clock, loaded with two weights, *m, m;* and the further these are removed from the axis or spindle, KM, the more heavily they will resist and counteract the escapement of the levers, and the rapidity of the rotation of the escapement-wheel, till the clock be brought to go neither too quick nor too slow.

The above construction is probably the basis of all the principal time-keeping machines in use in the 16th century. The great epoch in the history of horology is marked by the application to it of the pendulum (q.v.) as a regulating power. This was effected by Huygens (q.v.) about 1657. This philosopher, in adapting the pendulum to the machinery previously invented, had little more to do than simply to add a new wheel to the movement, so as to enable him to place the crown-wheel and spindle in a horizontal instead of a perpendicular position, that the lower arm of the balance—then of course perpendicular, instead of horizontal, as in De Wyck's clock—might be extended, as it were, downwards, and thus, in fact, be converted into a pendulum.

The principle of construction adopted by Huygens, from the peculiar action of the levers and spindle, required a light pendulum and great arcs of oscillation; and although, to secure isochronous vibration in these large arcs, the ingenious device of constraining the motion in a cycloidal curve was resorted to, yet the consequence was, as has been remarked, that "Huygens's clock governed the pendulum, whereas the pendulum ought to govern the clock." About ten years afterwards, the celebrated Dr. Hooke invented an escapement, which enabled a less maintaining power to carry a heavier pendulum. The pendulum, too, making smaller arcs of vibration, was less resisted by the air, and therefore performed its motion with greater regularity. This device is called the *crutch* or *anchor escapement*. It was brought by Hooke before the notice of the royal society in 1666; and was practically introduced into the art of clockmaking by Clement, a London clockmaker, in 1680. It is the form still most usually employed in ordinary clocks. It regulates the motion as follows: The pendulum is fixed at A, and hangs down behind the pallet-wheel (the last of the train of wheel-work), which revolves in the direction of BC, under the action of the weight; B and C are the pallets. When the pendulum swings to the left, AC rises, and a tooth escapes from C, while another falls on the outside of B, and, owing to the form of the pallet B, this latter recoils during the remainder of the swing. The same thing occurs on the pendulum's return; the arm AB rises, a tooth escapes from B, and another falls on the inside of C, and is pushed backwards by it during the remainder of the swing. The revolution of D is thus regularly retarded, one tooth being allowed to escape for every two oscillations—i.e., every two seconds—and as the wheel contains 30 teeth, it performs one revolution per minute (the seconds hand is fixed on the extremity of the axle of this wheel). During a portion of each contact between the pallets and teeth, the onward pressure of the wheel gives an additional impetus to the pendulum, so as to counteract the retarding effects of the resistance of the air and friction, which would otherwise bring it to a stand.

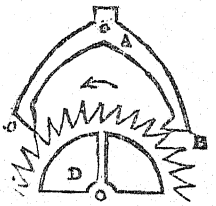


Fig. 2.

The only defect of this escapement is the recoil, and various modifications have been devised to obviate this. The first and most successful was made by George Graham, an English watchmaker in the beginning of the 18th c., and his improved form is called the *dead 'scapement* or *dead-beat escapement* (Fig. 3). Here the outer surface of B and inner of C are arcs of circles, whose center is A, and a little consideration will show that there can be no recoil. This escapement is adopted in time-keepers when great accuracy is required. Other inventions, as the *detached escapement*, the *pin-wheel escapement* in various forms, and the *gravity escapement* (described below), though very efficient, have not come into general use.

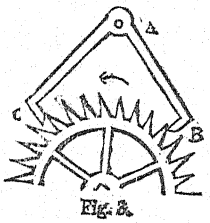


Fig. 3.

In the great clock in the new houses of parliament at Westminster, the pendulum is upwards of 13 ft. long, to beat 2 seconds, and its bob weighs 6 cwts. The motion is kept up by a *remontoir* or *gravity escapement*. On each side of the pendulum-rod a small metallic hammer is hung upon a peg. "The swinging of the pendulum first draws out a little bolt, that stopped the turning of a wheel; the wheel then goes round, under the influence of the weight, lifting one of the little hammers as it does so, until it is caught by another bolt. The hammer-head next falls by its own gravity, and strikes the pendulum-rod just as it is in the act of descending, communicating the force of its blow to quicken the movement; the same thing is afterwards repeated on the opposite side of the vibration, and then again on the same side; so going on alternately." The push thus given is evidently unvarying. The wheel has three stops and cogs on it, and goes once round in three beats of the pendulum, or in six seconds. With this contrivance "it is found that all the teeth of the several wheels may be rough, just as turned out from the casting, and the clock will nevertheless keep better time than it would have done with the most perfectly finished teeth under other arrangements."

The gradual perfection of the clock required also improvements in the pendulum (see PENDULUM).

The improvements in the escapement and the pendulum above referred to bring the mechanical perfection of the clock, as a time-keeping instrument, to the point which it has attained at the present day. But the art of horology would be incomplete unless there was some standard, independent of individual mechanical contrivances, to which all may be referred, and by which the errors of each—which must exist in the most perfect human contrivances—may be corrected. The movements of the heavenly bodies are still, as of old, the only standard for a general measurement of time, affording as they do marks of unvarying certainty, to be read by all alike; and clocks and other mechanical contrivances are individual and imperfect measures of the intervals, to be trusted only until there is a new opportunity of comparing them with the certain and public signals of the heavens. These signals can, however, only be accurately read by persons furnished with the proper apparatus, and instructed sufficiently in its use. This is done in observatories, and there are in most parts of this country now sufficient opportunities of setting clocks by a communication more or less direct with these establishments. When these are not to be had, the sun-dial may still be used with advantage, as a means of approximation to the correct time. The time which a clock ought to mark is *mean time*, the definition of which will be found in the article Day (q.v.). The *mean time* at any *place* depends on the longitude. Supposing a clock to be set to Greenwich mean time, a clock keeping mean time of any place will be 4 minutes faster for every degree of longitude east of Greenwich, and 4 minutes slower for every degree west. Since the introduction of railways, clocks are usually set, within Great Britain, to Greenwich mean time.

The methods by which time is determined in observatories belong to the details of practical astronomy. For the more ready transmission of correct time to the public, there is at Greenwich observatory, as well as some others, a ball which is dropped by means of electricity precisely at one o'clock. Within the last twenty years, however, there was invented a most ingenious device by which public clocks in a town can be kept at every instant in perfect agreement with the mean-time clock in the observatory. This is effected by an electric connection, and a modification of Bain's electric pendulum, invented by Mr. R. L. Jones of Chester, on the suggestion of Mr. Hartnup, the astronomer of the Liverpool observatory. For a description, see ELECTRIC CLOCK. The first public application of it was to the town-hall clock in Liverpool, when for the first time was seen the curious spectacle of a great clock with works nearly 100 years old keeping time with astronomical accuracy In the same way, a clock in the castle of Edinburgh, by whose mechanism a gun is fired precisely at one o clock every day, is controlled by the mean-time clock in the observatory on the Calton hill.

It is not known when the alarm or when the striking-mechanism of the clock was first applied. The alarm was adopted for the use of the priesthood, to arouse them to their morning devotions. The first striking-clock probably announced the hour by a single blow, as they still do, to avoid noise in churches. During the 17th c., there existed a great taste for striking-clocks, and hence a great variety of them. Several of Tompion's clocks not only struck the quarters on eight bells, but also the hour after each quarter; at twelve o'clock, 44 blows were struck; and between twelve and one, no less than 113! Many struck the hour twice, like that of St. Clement Danes, in the Strand, London.

The striking part of a clock is rather a peculiar and intricate piece of mechanism. In ordinary clocks, the impelling power is a weight similar to that which moves the time-measuring mechanism itself; but the pressure of this weight on the striking-machinery is only permitted to come into play at stated periods in course of the workings of the time-keeping apparatus—viz., at the completion of every hour; when the minute-wheel, which revolves once in an hour, and carries the minute-hand of the clock along with it, brings it into action by the temporary release of a catch or detent, permitting the weight wound up on the cylinder of the striking-apparatus to run down for a little, in doing which, the hammer is forced into action, so as to strike the bell. Whether the strokes shall be one or many, is determined principally by two pieces of mechanism, one called a *snail*, from its form or outline, with twelve steps, and the other a *rack*, with twelve teeth; but the intricate action of the whole it would be in vain here to attempt to explain. Suffice it to say, that the time during which the striking-weight is *allowed* to descend, varies according to the turning of the twelve steps of the snail on its axis, and the position of the twelve teeth of the rack, at different hours of the day; being sometimes only long enough to permit one blow to be given by the hammer on the bell, and at another time long enough for twelve such blows.

The consideration of portable time-keepers (watches and chronometers) is reserved for the head WATCH.

HOR'OSCOPE. See ASTROLOGY.

HORROCKS, JEREMIAH, an astronomer of remarkable genius, generally known as t' first observer of the transit of Venus, an account of which phenomenon he has given in a Latin treatise entitled *Venus in Sole visa*. He was born at Toxteth, near Liverpool, date uncertain, supposed to be 1618; he entered Emanuel college, Cambridge, May 18, 1632; was appointed in 1639 to the curacy of Hoole, Lancashire, in which village he made his famous observation (Nov. 24, 1639, o. s.), while a mere youth. Horrocks died suddenly

on Jan. 3, 1641, the day before an intended journey, having promised to visit his chief friend, William Crabtree. Dr. Wallis, his contemporary, informs us that Horrocks at the time of his death "had not completed his 23d year." Hearne, in his memoranda, tells us how Horrocks was called away, during his observation of the transit, "to his devotions and duty at church;" to which interruption the astronomer thus alludes in his treatise: "*Ad majora avocatus, quæ ob hæc, parerga negligi non decuit.*" Newton, in the *Principia*, bears honorable testimony to the value of Horrocks's astronomical work, especially commending his lunar theory as the most ingenious yet brought forward; adding, "and if I mistake not, the most accurate of all." Horrocks is frequently mentioned by the scientific men of the 17th c.; the observation of the transit by no means being regarded as the most important of his astronomical achievements. Hevelius printed the *Venus in Sole visa*, which first appeared in Germany (1662). In 1672 Horrocks's fragmentary works were published under the auspices of the royal society, being edited by Dr. Wallis, with the title *Jeremiæ Horroccii Opera Posthuma*, etc. The name of Jeremiah Horrocks, long forgotten, except by astronomers, is now, "after the lapse of more than two centuries," engraven on marble in Westminster Abbey.

HORRY, a co. in e. South Carolina, bordering on North Carolina and the ocean; crossed by the Wilmington, Columbia, and Augusta railroad, and intersected by the Waccamaw river; 1000 sq.m.; pop. '70, 10,721—3,235 colored. It has a level surface with many marshes. The productions are rice, sweet potatoes, and pork. Co. seat, Conwayborough.

HORRY, PETER, a native of South Carolina; soldier in the revolutionary army; serving as a brig.gen. with Francis Marion, whose biography he wrote in conjunction with Weems.

HORSA. See ANGLO-SAXONS, *ante*.

HORS DE COMBAT, a French term, literally meaning "beyond the battle," is used to signify a combatant, or body of combatants, so completely beaten either by physical force or strategy, as to be incapable of further action in the struggle actually under consideration.

HORSE, *Equus*, a genus of pachydermatous quadrupeds of the family *equidæ* (q.v.), or *solidungula*, generally regarded as including all the species of the family, although sometimes limited (see Ass), so as to contain only one species, the most important to man of all animals that are used as beasts of burden and of draught. The principal zoological characters are already given in the articles EQUIDÆ and ASS, and a more particular description of the horse seems to be unnecessary. The native country of the horse is uncertain. Some contend for Asia, and some for Africa; some suppose that the horse was first domesticated in Egypt, and quote Scripture in support of their opinion, but to no better purpose than to show that at a very early period it was in use as a domesticated and valued animal among the ancient Egyptians; whilst others adduce arguments not more conclusive to show that it was originally domesticated in the n.e. of Asia; some think it not improbable that Europe also, and even Britain, had indigenous horses. Whether certain wild races of central Asia and the n. of Africa are really indigenous to the regions in which they are found, or the offspring of animals which have escaped from domestication, like those of America, and whether the origin of the domestic horse is to be referred to one original form, or to several forms somewhat different, and belonging to different countries, are questions also uncertain; and the last of them is very similar to that which is so much agitated respecting the dog (q.v.), although it must be admitted that the diversities are not so great as in that case.

The lips and teeth of the horse adapt it for cropping the short herbage of dry plains or hills, so that it finds abundance where an ox would be very insufficiently supplied. The feet are also adapted to dry rather than to soft or swampy ground. On soft ground, not only is the foot apt to sink, not being very broad, but the horny hoof is softened, and a diseased state of the feet is the result, as in the case of many of the great dray-horses of London, reared in the alluvial districts of the east of England. The horse, however, requires a liberal supply of water; and during the dry season, in the hot plains of South America, great troops of wild horses often rush furiously to the rivers, and as they approach the drinking-place, trample one another under foot, vast numbers of skeletons remaining to bleach in the sun.

Wild horses are found on the plains of central Asia. Some also inhabit mountainous or hilly districts both there and in the n. of Africa. They abound still more in the grassy plains of North and South America, although they were first introduced into America by Europeans; and certain tribes of Indians, both in North and South America, have become at least as equestrian in their habits as any of the Tartars of the east. Wild horses are also found in the Falkland islands, into which they were introduced by Europeans, and a peculiar breed has been found in a wild state in the island of Celebes.

The races or varieties of the horse have an evident relation to the climate of the countries in which they occur. Those of cold and stormy regions are comparatively small and rough-haired; those of more favored climates, large and sleek. There are also differences, more evidently to be ascribed to domestication, according to which certain breeds are particularly adapted to certain kinds of work, some excelling in fleet-

ness, some in endurance, some in mere strength for burden or draught. The slender form of the race-horse or hunter contrasts almost as strongly with the ponderous solidity of the dray-horse, as the great size of the latter does with the diminutiveness of the Shetland pony.

Wild horses congregate in troops, sometimes small, but sometimes of many hundreds. The males have fierce contests for the supremacy, and males that have contended unsuccessfully are often driven off to a solitary life. On the appearance of danger, the chief stallion of a small troop seems to direct the movements of all, and even the largest troops seem instinctively to move in a kind of concert, so that when they are assailed, the stronger animals oppose the enemy, and protect the younger and weaker. Wolves, even when in packs, attack with success only weakened stragglers, and even the jaguar is repelled. In fighting, horses either raise themselves on their hind-feet, and bring down the fore-feet with great force on the enemy, or wheeling about, kick violently with the hind-feet.

The *tarpan* of Tartary is one of those races of wild horses which are sometimes regarded as original, and not descended from domesticated animals. It is of a reddish color, with a black stripe along the back, and black mane and tail. The eye is small and vicious. Tarpans are sometimes caught by the Tartars, but are with great difficulty reduced to subjection. In some of the steppes of central Asia are wild horses of a white or dappled-gray color.—The wild horse of South America is there called the *mustang*. It exhibits considerable diversity of color, but bay-brown is the most prevalent. It is strong and active, and is often taken with the lasso, and employed in the service of man. A curious method is practiced by some Indian tribes of promptly subduing its wild nature, and rendering it tractable, by blowing strongly with the mouth into its nostrils. By other tribes, it is subdued more rudely. It is thrown on the ground, and ere it can recover, a man gets upon its back, whom, when it rises, it cannot shake off, and who retains his seat until it is quite submissive.—The *koomreh* of n. Africa is regarded by col. Hamilton Smith as a distinct species (*E. hippagrus*). It has no forelock, but woolly hair on the forehead, is of a reddish-bay color, without stripe on the back or any white about the limbs, has limbs of a somewhat ass-like shape, and the tail covered with short hair for several inches at the root. It is an inhabitant of mountainous regions.

Of domestic varieties and breeds of the horse, the number is very great, almost every country or considerable district having one or more of its own, and particular breeds being valued on account of their fitness for particular purposes. The breeds are also continually varied by crossing, and great improvements have thus been effected. The superior fleetness of the English race-horse and endurance of the hunter are ascribed to the crossing of the old English breed of light-limbed horse with the Arabian; and the English dray-horse, remarkable for its great size and strength, in like manner owes much of its excellence to the crossing of the largest old English breed of draught-horse with the Flemish. A breed produced by crossing one of the lighter kinds of English draught-horse with the race-horse is in the highest esteem for carriage-horses. North America has a breed of light-limbed horses, remarkable for fast trotting. The *Suffolk Punch* has been the origin of many of the most useful kinds of draught-horses employed in Britain for ordinary farm-work. The *Clydesdale horse* is also one of the best breeds of this class, and is an improvement on an older breed. Numerous breeds of smaller size, *ponies*, have long existed in different parts of Britain, and in almost all other countries. The *Shetland pony*, which, compared with the dray-horse, is like a pocket edition of a book beside a great folio, is most prized when most diminutive, and sometimes does not much exceed a large dog in stature. A strong man has been seen to lift one with his arm, and again to ride on its back, whilst at the same time he walked with his feet on each side on the ground. The Shetland pony is, however, a very hardy animal, and remarkably strong.

The Arabian horse has long been the object of untiring care and attention, and to this very much of the excellence of the race is certainly to be ascribed. The regard of the Arab for his horse has long been famous. Very similar in some respects to the Arabian is the Barbary horse, which was highly prized in western Europe before the Arabian was known there, and from the name of which is derived the English word *barb*.

The horse has been used from the most remote ages both for riding and for drawing carriages, but rather for pomp or pleasure, the chase, and war, than for agricultural or other labors, for which oxen and other animals were for a long time more generally employed. The horse is an animal of no little intelligence, docility, and affectionateness; qualities of which the display would certainly be more general and perfect, if it were not for the cruel treatment so commonly practiced in "breaking" and otherwise. The horse has a very strong memory of places, and finds again very readily a road which it has once traveled before. Its caution in advancing on swampy ground has often excited admiration. It seems often to enter with a kind of enthusiasm into the work in which it is engaged: the war-horse evidently delights in the martial music and military movements to which he has been accustomed; the racer and the hunter seem to know the object of their exertions, and to be as keenly bent upon it as their riders; and the draught-horse often exhibits much acquired expertness in situations of considerable dif-

ficulty. Instances are also on record of the remarkable display of intelligence in such things as the opening of doors, corn-chests, etc.; and two instances are known of horses which have learned to turn the tap of a water-barrel in order to obtain water, one of which also ended by shutting it again. A horse has been seen to procure a supply of apples in an orchard by throwing himself forcibly against the trees and shaking them.

The flesh of the horse is used as food in some countries. Its use has recently found advocates in France and some other parts of Europe. It is sold in London as food for dogs and cats. Mares' milk is much used by some of the tribes whose chief wealth consists in their horses: and the Kalmucks subject it to fermentation, and distill from it a kind of spirit. The hide of horses is made into leather, which is used for covering large office and board-room tables, etc. The long hair of the mane and tail is used for making haircloth, stuffing mattresses, etc.

Hybrids between the horse and the ass are noticed in the articles HINNY and MULE. Hybrids have also been produced between the horse and the zebra, and between the horse and the quagga, exhibiting, in some degree, the stripes so characteristic of these species; but they have been turned to no use.

Fossil Horse.—The remains of the horse have been long noticed associated with the mammoth, rhinoceros, and other extinct quadrupeds, in the drift formations and ossiferous caverns in the new world, as well as in the old. Their occurrence in America is the more remarkable, from that continent being entirely without the horse when it was discovered by Columbus. Cuvier was unable, in the fragments that he examined, to see any difference from the similar portions of the existing species. Meyer and Kaup have pointed out distinctive characters, and Owen has shown that the remains observed in this country belong probably to two different species. The largest (*equus fossilis*) was about the height of a middle-sized domestic horse, and differed from this animal in possessing a proportionally larger head and jaws, resembling in this respect the wild horses of Asia described by Pallas, and in having the molar teeth, while equal in length, yet decidedly smaller. The second species (*equus plicidens*) was about the size of a large ass, and differed from the other species, as well as from the living horse, in the more complex plications of the enamel of its molar teeth.

Horses, of whatever breed or description, should be of good size, shape, and style; for superior animals are fed and kept at the same cost as inferior sorts, are always able to perform their work easily and satisfactorily, and are at any time salable at remunerative prices. To produce such animals, requires careful selection of sound, active, symmetrical, well-descended parents. The mare carries her colt eleven months, but occasionally exceeds her time by one or two weeks. Farmers prefer their mares to foal in May, from which time the age is generally calculated, but on the turf, ages date from Jan., and hence the earlier the racing foals are dropped the better. Parturition is usually performed easily and without any assistance, the foal soon getting on his legs, and sucking. Good grass, with a feed of oats daily, will insure an abundant supply of milk. Weaning may take place in five or six months; and the foal, when taken from its mother, must be supplied with a few oats and bran, some good hay, and comfortable shelter at night. At a year old, colts are generally castrated; and are gently broken in and lightly worked when about three years old; but under good treatment they continue to grow, and ought not to be put to severe work until they are five.

Oats and hay are the staple articles of food for hard-working horses. The oats should be sound, sweet, and heavy; and for hacks and hunters, are seldom sufficiently dry until they are a year old. Along with good hay, 10 lbs. is a fair allowance. To insure thorough mastication and digestion, oats should be given either slightly bruised or along with some chaff. For coaching or farm-work, a few beans or peas should be given; half a bushel, along with a bushel of oats and hay, is a usual weekly allowance for well-kept farm-horses. Clover and rye-grass hay (q.v.), such as is common throughout Scotland, is more palatable and nutritive than the meadow-hay in general use in England. Riding-horses eating a fair allowance of oats, will consume daily 14 lbs. of hay; but the heavier class of horses require more. Farmers use oat, pea, and bean straw for fodder during the winter months, and in most well-managed establishments a considerable portion of the fodder is now given cut, which enables the hard-worked horse to fill himself more rapidly, and thus gives him more leisure for rest and repose. Cart-horses usually have an evening allowance of sliced Swedes or carrots; a daily pound of linseed-cake is now frequently added, to keep the coat glossy; whilst a weekly bran-mash is advisable, and should contain during winter an ounce of pounded niter. Horses should be liberally supplied with water at least three times daily, nor is it ever necessary to restrict the supplies, except for a few hours before severe fast work, and when the animal is much overheated and fatigued. In some well-constructed boxes and stables it is so arranged that water is constantly before the animal in a shallow vessel capable of holding about a quart, and which, as it is removed, is slowly replenished, and thus cannot be drunk either with undue rapidity or in injurious quantity. During summer, horses generally have such green food as grass, clover, or vetches; but if their work is severe or long continued, oats and hay ought still to form the principal articles of diet. In summer, farm-horses are often turned out to graze after their day's work is over; but it is generally more economical to bring their green food to the stable, or, better still, to commodious yards. It is seldom advisable to follow the old-fashioned

plan of turning hacks or hunters out to grass, as they are apt to get kicked or otherwise injured, and lose besides their condition. If not required during the summer months, they are better and safer in a large yard or a commodious box, where they can have proper feeding and daily exercise. They will thus, at little extra expense, be kept in good condition and fit for work, their legs free from blemishes, and their constitutions uninjured by violent diversities of feeding and management. The small stomach and natural habits of the horse indicate the necessity of his being fed at frequent moderate intervals of five or six hours. In most localities, farm-horses turn out at seven, returning to the stable at 11.30 or 12, being fed and rested for an hour and a half or two hours, and then returning to work for four or five hours. In the midland and southern counties of England, the straggling position of the fields, and their inconvenient distance from the stables, induce many farmers to keep their horses in the yoke from seven until two or three, when they finish for the day. This practice is, however, by no means commendable, unless the work is very light, and the horses have a feed, a few mouthfuls of water, and 10 or 15 minutes' rest about mid-day.

To insure health, horses must be kept in commodious, well-lighted, airy, properly-ventilated stables, which ought to be erected only in dry situations, should be thoroughly underdrained, and well paved, if possible without a loft overhead, whitewashed annually, and always kept scrupulously clean and free from smell. This may be effected by the prompt removal of soiled or wet litter, and by strewing the floors daily with a little gypsum, or M'Dougal's disinfectant powder. Where there is room, loose boxes are preferable to stalls, especially for the lighter sort of horses, that spend much of their time indoors. With proper feeding, exercise, and grooming, with plenty of fresh air, and good stable management, horses are scarcely ever out of health, and require neither balls, cordials, nor any such messes. Without professional advice, no groom or carter should, under any pretense, be permitted to indulge his predilection for physicking or doctoring healthy horses.

HORSE, a miner's term, applied to any intruded material which is the apparent cause of a sudden interruption in the continuity of a mineral that is being quarried. With vein-miners a detached mass of rock or spar which fills the vein receives this name, while colliers apply the term to the shale which occupies a natural but sudden thinning out of the coal-bed, as well as to such interruptions as seem to have been the channels of small streams, and which were subsequently filled up by the clay that formed the roof of the coal.

HORSE-CHESTNUT, *Æsculus*, a genus of trees of the natural order *sapindaceæ*, having large opposite digitate leaves, flowers with five spreading unequal petals, and a leathery 3-valved capsule covered with soft spines. The seeds, which are not more than three in each fruit, are large, and somewhat resemble chestnuts; but the habit of the trees, their leaves, and their flowers, are very unlike those of chestnuts, with which they have no botanical affinity.—The COMMON HORSE-CHESTNUT (*Æ. hippocastanum*) is a much esteemed ornamental tree, very frequently planted in Britain, and in all parts of Europe of which the climate is suitable, on account of its rich foliage and its erect racemes of beautiful reddish-white flowers, which are produced at the extremities of the branches and contrast admirably with the dark green of the leaves. At St. Petersburg the horse-chestnut is a greenhouse tree. It is supposed to be a native of Persia or some part of the east; but, strangely enough, its native country is still somewhat uncertain. It was introduced into western Europe, from Constantinople, in the end of the 16th century. It attains a great size, sometimes rising to the height of 100 ft., and extending its branches very widely, whilst they often droop almost to the ground. The leaves have long stalks, and seven obovate-wedged-shaped leaflets. The wood is soft, not very strong, nor very durable in the open air; but is used for many ordinary purposes, and by carvers, turners, etc. The bark is bitter and astringent, containing a bitter principle called *æsculine;* it has been used in tanning and dyeing; that taken from branches not very old has been extensively used on the continent of Europe as a substitute for Peruvian bark. The rind of the seeds contains a coloring matter which has been used in dyeing; the husks also have been used in dyeing. The seeds are unpleasantly bitter, and contain so much of the saponaceous substance prevalent in this natural order that when reduced to powder they may be used for washing. They contain, however, a large quantity of starch, which, when extracted and freed from bitterness by means of an alkaline solution, is pleasant and nutritious. It is prepared on a large scale and at a cheap rate in France. Horse-chestnuts have long been employed in various countries as food for oxen, sheep, swine, and horses, all of which are fond of them and grow fat upon them. In Britain, however, they are still very generally allowed to rot beneath the trees. It is said that when the horse-chestnut was first introduced into Britain, it did not perfectly ripen its seed, which it now does even in the northern parts of the island.—The other species of *æsculus* are natives of North America. The foliage is very similar to that of the common horse-chestnut. Both the leaves and fruit, however, of the BUCKEYE or AMERICAN HORSE-CHESTNUT (*Æ. ohiotensis*) are very poisonous.—North America possesses also a number of species of a nearly allied genus, *pavia*, with very similar foliage, smaller flowers, and smooth fruit. The seeds of *P. macrostachya* or *P. edulis*, the EDIBLE BUCKEYE, are eaten, either boiled or roasted. This species is a shrub

with long and beautiful racemes of fragrant white flowers, which have long projecting stamens. It is a native of the southern states, and seldom ripens its fruit in England. *P. indica*, is a lofty tree, growing at elevations of 8,000 to 10,000 ft. in the Himalaya, and producing seeds very similar to those of the horse-chestnut, which, although bitter, are eaten in times of scarcity.

HORSE-EATING. See HIPPOPHAGY.

HORSE-FLY. See FOREST-FLY.

HORSE, FOSSIL, in general terms, the fossil remains of animals which have been classified as belonging to the *equidæ*, or horse family. These remains are all confined to the tertiary formation, with the exception of a few, which are recent. They have been found in the eocene, pliocene, and miocene of Europe and America, but the greatest number and the most perfect gradation are found in North America, which, it is claimed, gives evidence of descent from the eohippus of the eocene to the present one-toed horse. Thirty-five o forty species, which compose several genera, are said to have been discovered, the classification having been made upon variations in the form and size of the skeleton. Different forms were found from time to time, and although it was believed that they were links in a chain of organisms which connected the horse zoologically with the eohippus, they were broken links, and no perfect chain could be formed out of them. Now, however, it is claimed that the chain is complete, all the missing links having been found, principally by Prof. O. C. Marsh, of Yale college, in the tertiary beds of our western territories. The ungulates, the sixth order of the class mammalia, are divided into two sections—those in which the toes are odd in number, and those in which they are even. The horse family, *equidæ*, belongs to the odd-toed section, which also contains the rhinoceros and the tapir. It is the seventh and last family, and is now regarded as containing seven or more genera. These genera are all extinct, and known only in the fossil state, except the present species, *equus caballus*. The argument for the gradual evolution of the horse through these extinct genera is well though briefly stated by Prof. Joseph Le Conte (*Elements of Geology*, N. Y. 1878), in a chapter on the age of mammals, in which he traces indications of evolution in other animals, one of these being the gradual enlargement of the brain cavity, and says: "In conclusion it will be interesting and instructive to run out one of these branches and show in more detail the genesis of one of the extreme forms. For this purpose we select the horse, because it has been somewhat accurately traced by Huxley and Marsh. About thirty-five or forty species of this family, ranging from the earliest eocene to the quaternary, are known in the United States. The steps of evolution may therefore be clearly traced. In the lowest part of the eocene basin (coryphodon beds) of Green river is found the earliest known animal which is clearly referable to the horse family; viz., the recently described eohippus of Marsh. This animal had three toes on the hind-foot and four perfect, serviceable toes on the fore-foot; but, in addition, on the fore-foot an imperfect fifth metacarpal (splint), and possibly a corresponding rudimentary fifth toe (the thumb), like a dew-claw. Also, the two bones of the leg and forearm were yet entirely distinct. This animal was no larger than a fox. Next, in the middle eocene (Bridger beds), came the orohippus of Marsh, an animal of similar size, and having similar structure, except that the rudimentary thumb or dew-claw is dropped, leaving only four toes on the fore-foot. Next came, in the lower miocene, the mesohippus, in which the fourth toe has become a rudimentary and useless splint. Next came, still in the miocene, the miohippus of the United States and nearly allied anchithere of Europe, more horse-like than the preceding. The rudimentary fourth splint is now almost gone, and the middle hoof has become larger; nevertheless the two side-hoofs are still serviceable. The two bones of the leg have also become united, though still quite distinct. This animal was about the size of a sheep. Next came, in the upper miocene and lower pliocene, the protohippus of the United States and allied hipparion of Europe, an animal still more horse-like than the preceding, both in structure and size. Every remnant of the fourth splint is now gone; the middle hoof has become still larger, and the two side-hoofs smaller and shorter, and no longer serviceable except in marshy ground. It was about the size of the ass. Next came, in the pliocene, the pliohippus, almost a complete horse. The hoofs are reduced to one, but the splints of the two side-toes remain to attest the line of descent. It differs from the true horse in the skull, shape of the hoof, the less length of the molars, and some less important details. Last comes, in the quaternary, the modern horse—equus. The hoof becomes rounder, the splint-bones shorter, the molars longer, the second bone of the leg more rudimentary, and the evolutionary change is complete."

The following tabular statement will give a good idea of the relations of the genera of the horse family at a glance.

EQUIDÆ, OR HORSE FAMILY.

1. *Eohippus:* lower eocene of New Mexico. Animals of this genus small, about the size of a fox; fore-feet having four toes with a rudimentary thumb; hind-feet three toes, all the digits terminating in hoofs; bones of leg and forearm entirely distinct.

2. *Orohippus:* found in beds somewhat above the latter; about the size of a fox; fore-feet four-toed; third digit largest; hind-feet three-toed; all trace of thumb of eohippus gone; and the last premolar resembles the molars instead of the premolar in front

of it, as in eohippus. Canines large and widely separated from the molars. Dental formula same as in eohippus, viz.:

$$i\,\frac{3-3}{3-3};\ c\,\frac{1-1}{1-1};\ pm\,\frac{4-4}{4-4};\ m\,\frac{3-3}{3-3}=44.$$

3. *Mesohippus:* lower miocene, N. A. About the size of a sheep, but having longer legs; hind-feet three-toed; fore-feet three-toed, but having rudimentary metacarpal (splint-bone), representing the little finger; last two premolars resemble the molars.

4. *Miohippus:* upper miocene, N. A. Animal rather larger than a sheep; all the feet three-toed, toes of nearly equal size; the little finger of the left hand has the same rudimentary metacarpal as in the preceding; no antorbital fossa.—*Anchitherium:* genus of European miocene, allied to miohippus, but having many characteristics resembling the paleotherium, so that it may be regarded as transitional between equidæ and paleothoridæ; species about the size of a sheep; all the feet are three-toed, and all the toes touch the ground, but middle toe larger in proportion than in preceding, and there is no representative of the little finger; differs from miohippus in having a large antorbital fossa.—*Hipparion:* later southern European miocene and pliocene periods; skeleton like that of horse in general conformation; feet three-toed, but middle toe much the largest and the only one of any use or that touches the ground.

5. *Protohippus:* lower pliocene of N. A. This is considered the North American equivalent of the European hipparion, although larger than the latter, some species having been about the size of the ass. The formation of the feet was the same as in hipparion.

6. *Pliohippus:* pliocene. Feet resemble in structure the modern horse or genus equus; that is, there is only a single functional toe, the second and fourth toes being rudimentary (splint-bones). This genus, however, differs from equus in having a large antorbital fossa, and also in having an additional upper premolar, the dental formula being as follows:

$$i\,\frac{3-3}{3-3};\ c\,\frac{1-1}{1-1};\ pm\,\frac{4-4}{3-3};\ m\,\frac{3-3}{3-3}=42.$$

7. *Equus.* This genus, which includes the modern horse, is thought to have made its appearance at the close of the miocene or commencement of the pliocene period. In the old world the first appearance of true horses is thought to have been in the *equus sivalensis* of the Siwalik hills in the upper miocene or lower pliocene. In the pliocene of Europe, North America, and South America the genus is well represented, and the *equus fossilis* of the post-pliocene and recent periods is specifically undistinguishable from the existing *equus caballus.* (Nicholson.)

The dental formula of the horse is as follows:

$$i\,\frac{3-3}{3-3};\ c\,\frac{1-1}{1-1}\text{ or }\frac{0-0}{0-0};\ pm\,\frac{3-3}{3-3};\ m\,\frac{3-3}{3-3}=40.$$

The above statement is an outline of the argument in favor of the theory that the horse (as well as all the members of the animal and also of the vegetable kingdom) is the result of gradual evolution. The objectors to this theory do not deny that there are close relations in structure, or that there *might* have been great similarity in the habits of the different genera, as they have been classified; but they deny that there is any evidence which indicates that one genus was the progenitor of another, or that the various species, of which there are more than thirty, were ever produced from one origin. It is held that there is nothing to warrant the conclusion that the eohippus should lose his thumb and pass into the genus orohippus, or that the latter should all at once pass from the size of a fox to that of a sheep and lose one of the four toes of his fore-foot. On the contrary, it is held that there are structural characteristics in the genera which warrant the conclusion that one genus was not the progenitor of another, or that one was not derived from the other by any law of natural selection.

In miohippus, for instance, there is no antorbital fossa, while in anchitherium, which is said to follow in development, there is. It might, however, be said that the latter is a European type; but the American pliohippus of the pliocene beds—the genus which immediately precedes that of the horse, or equus, as the next fossil form is held to be—has also a large antorbital fossa, while the latter has not. Again, the genus equus in the above arrangement, and which is the last of seven genera in a scale of progression, has been classified by some, including Dr. J. E. Gray, the eminent British naturalist, as distinct from that of the ass and zebra, which they place in the genus asinus. Linnæus and Cuvier, however, placed all three in the genus equus. But it is held that, whether classed as two genera or one, they present the same distinctive characteristics which they had more than 4,000 years ago, and that there is no evidence for a belief that they are not distinct creations, notwithstanding that the skeleton characteristics of these animals are precisely similar (Cuvier's reasons for placing them in one genus), there being no anatomical differences. How then, it is asked, if the horse and zebra and ass differ so widely, even when having the same kind of skeleton, can it be held

that skeletons of animals differing as much as miohippus and pliohippus—the latter having a large antorbital fossa while the former had none, and having one toe while the former had three—belong to the same family, and stand so closely related that one has sprung from another? There are many fishes whose skeletons have greater similarity than obtains in the fossil horse family, but whose other characteristics are entirely distinct, and it is held that there is no evidence of their ever having been otherwise. On the other hand, it is not denied that there is the highest evidence of a plan in creation furnished by the discovery of these fossil horses, as they are called, as there are other evidences of a plan exhibited in all the works of nature. But it is said that while they furnish evidence of a plan, they furnish evidence also that that plan was carried out by distinct creations from the peculiar anatomical differences, as noticed above, and which cannot be accounted for by any law of differentiation in the species or genus which should cause it to deviate from miohippus to pliohippus, and from the latter again to equus, miohippus having no antorbital fossa—pliohippus having large antorbital fossa, and equus, again, having none. In view of the facts and arguments on both sides, it is probably safe to say that the evolution in the instance referred to is, at least, not yet proved. It remains an ingenious and interesting hypothesis.

HORSE-GUARDS, the name applied to a large public office in Whitehall, appropriated to the departments under the general-commanding-in-chief. The word horse-guards is used conventionally to signify the military authorities at the head of army affairs, in contradistinction to the civil chief, the secretary of state for war.

HORSE-GUARDS, Royal, or Oxford Blues, is the third heavy cavalry regiment of the household brigade. The regiment was raised in 1661 from the remnants of the disbanded army of the late commonwealth. It has ever proved a loyal corps, although it readily transferred its allegiance from James II. to William III. It took part in Marlborough's campaigns; served under the duke of Wellington in the Peninsula and at Waterloo, and has always been considered one of the finest heavy cavalry corps in the world. The guards of state for the sovereign are taken either from its ranks or from those of the life-guards. The present uniform consists of a steel helmet, with plume, a steel cuirass over a blue coatee, leather breeches, and knee-boots; the horses are black. The establishment of the regiment consists of 1302 of all ranks, with 825 horses, exclusive of officers' chargers.

HORSE MACKEREL. See Tunny, *ante.*

HORSEMANSHIP. Throughout history the art of managing the horse and riding on his back has ranked high among useful and graceful accomplishments. According to Cæsar and Livy, the Numidians and Mauritanians rode their horses without either bit or saddle, and guided them solely by using a small switch, which was applied to either side of the neck, according as they wished to turn. The Persians trained their horses to kneel to receive their riders, and were the first to introduce saddles. Saddles of a similar shape to those now in use were not known till the 14th c., and side-saddles were introduced about 1388. Stirrups were used in the 5th c., but were not common even in the 12th.

The two essentials for riding are a firm seat and a light hand, as without a combination of the two no one can become a good horseman. In every description of riding, the light delicate "hand," just feeling the mouth of the horse, and playing the bit in accordance with his movement, will insure success; and it is to this delicacy of wrist that we must attribute the ease and skill with which ladies often ride the most high-spirited animals, which, in rougher hands, would be unmanageable.

The first lesson in horsemanship is to learn to mount safely and easily; and the ordinary and on the whole least objectionable way is as follows: Stand at the shoulder of the horse, looking towards his tail, and taking the reins in the right hand, divide them by the middle-finger of the left till you feel the horse's mouth; then take hold with the left hand of a lock of the mane, lift the left foot into the stirrup, and using the mane as a slight hold, spring into the air, taking hold of the back of the saddle to assist in getting the right leg easily over the horse, steadying the fall of the body by the right hand on the pommel, and then arranging the stirrups. In dismounting, exactly the reverse of this process is followed, or both feet may be disengaged from the stirrups at once, and the rider may vault from the saddle to the ground with greater rapidity, and less risk of falling if the horse chance to move on.

There are four different styles of riding practiced among modern civilized nations—viz., the military, road, hunting, and racing styles. The military style differs in many particulars from the others, as, owing to the long stirrups used, the soldier is obliged to sit well down in his saddle, with his body erect, the seat being preserved more by balance than by a tight hold by the leg or thigh.

In the seat for road-riding, the stirrups are arranged at such a length that when the feet are hanging loose, they shall just touch the anklebone, and the rider usually inserts the feet only as far as the "ball" of the foot. In riding, have the horse well in hand, to assist in supporting him, in case of stumbling; the seat firm, to be secure in case of shying; and a knowledge of handling the bridle, to insure a quick and ready response. In hunting, a much firmer seat is necessary; the stirrup-leathers are about two holes shorter, the feet pressed "home" in the stirrups, which otherwise would be apt to be

lost in jumping; the leg from thigh to the knee well forward, and nearly at right angles to the upper part of the body as inclined forward; the legs perpendicular, the heel well down, and the toe pointing nearly straightforward. This "seat" the hunter has in common with all equestrian nations, as the Arabs, Tartars, Persians, Egyptians, Cossacks, Magyars, and Circassians, the last mentioned nation carrying it to such an extreme that the leg assumes the form of the letter V, with the knee for the apex. In riding at a fence, "collect" the horse into the pace at which he goes with most ease to himself; keep him straight at the fence till he rises; "ease" his mouth by leaning forward; take especial care not to confine it when he is making his effort, or you will pull him into the fence as he descends; lean well back in the saddle, and gently take hold of his mouth to support him on landing. Do not gallop with a loose rein (excepting downhill, when the horse requires his head free), for the horse will go with a straggling pace, which is very undesirable. For racing, the essentials are a good and powerful seat, good "hands," a great knowledge of pace, and quickness to take advantage of any chances of success. The jockey's seat is peculiar, as his object is to give as much ease as possible to his horse. He rides very much forward, frequently standing in the stirrups, and regulating his pull at his horse according to his orders.

As the strongest part of a horse, and also the center of action, is situated at a point just behind his shoulder-blades, the nearer we can ride to this the better, and riding rather forward in the saddle is a relief to the horse, while leaning back, as it bears upon his loins—his weakest part—is a cause of fatigue. The grip in riding should be obtained by the knee, the thighs and the calves slightly. The thigh is the most essential part of a good and strong seat. Few riders whose thighs are short and round, have a good seat; while, on the other hand, jockeys and tall thin men, whose thighs are long, and more or less hollowed on the under side, are generally very firm.

No one can pretend to horsemanship without a knowledge of the proper action for emergencies. If a horse runs away, do not exhaust yourself by vain pulling, but guide him out of danger, and let him run till he is tired. A Bucephalus noseband is a great security against bolting. If a horse rears, loosen the reins, and lean forward; in hunting, the "art of falling" consists in getting clear of your horse. In case of a horse kicking, keep his head up as much as possible, and sit firm in the saddle.

HOR'SENS, a small but very old t. and seaport on the e. coast of Denmark, and one of the prettiest and most thriving in the country, is situated at the head of the fiord of the same name, 25 m. s.w. of Aarhuus. It contains two churches, has four bridges, and carries on manufactures of tobacco and a considerable general trade. Pop. '70, 10,501.

HORSE-POWER, a term used in expressing the force of a motive power. It is based upon the assumption that horses in general perform a certain constant amount of work in a specified time; an assumption which is evidently erroneous. The fundamental unit of work is the foot-pound (q.v.); but in measuring the work of a horse by this unit, the estimates of the most celebrated engineers differ widely from each other: Boulton and Watt, basing their calculations upon the work of London dray-horses (working eight hours a day), estimated it at 33,000 foot-pounds per minute. D'Aubuisson, taking the work done by horses in whims at Freiberg, estimated the work at 16,440 foot-pounds, working eight hours a day; under similar circumstances, Desaguliers's estimate was 44,000; Smeaton's, 22,000; and Tredgold's, 27,500 foot-pounds; 17,400 is thought to be near the truth. It matters little, however, what number is assumed, provided the same be always used; and accordingly the original estimate of Watt is still counted a horse-power. In calculating the power of a steam-engine in terms of this unit, the general rule is to "multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet, and the number of strokes per minute: the result divided by 33,000 will give the horse-power;" but it is necessary to deduct about $\frac{1}{16}$th of the whole, as an allowance for friction.

HORSE-RACING dates from the times of the early Greeks and Romans, among whom it was a favorite sport. In England, Charles I., Cromwell, and Charles II. were more or less patrons of the turf; and the last-named monarch was a regular frequenter of Newmarket, which, partly from this reason, became the metropolis of racing. William III. and queen Anne were also patrons of horse-racing. Flying Childers, bred in 1715 by the duke of Devonshire, was long considered to have been the fleetest horse ever known; he carried nine stone at Newmarket, and ran 3½ m. in 6 minutes 40 seconds; he was never beaten, and produced 497 winners, besides realizing £200,000 in stakes. The celebrated horse Eclipse, the fleetest from the time of Childers, was bred in 1764 by the duke of Cumberland. Commencing at five years old, this horse won eleven plates, was never beaten, and became the sire of innumerable winners. The modern race-horse is considerably taller and of earlier maturity than the original type, partly from judicious crossing, and also from early high-feeding and training; yet there has been a loss of stoutness of constitution, although, for speed, no pure bred Arab has a chance with a modern thorough-bred. The horses are entered as yearlings (a race-horse's age dates from Jan. 1 in the year he is foaled); but of 240 entered in this way, rarely more than 25 come to the post two years afterwards, the majority being found practi-

cally useless for racing purposes, and the forfeits from these horses thus "scratched" form by far the greater portion of the splendid prizes of the turf. (It has been calculated that there are 1500 thorough-bred brood-mares in England; that these produce annually about 1100 foals.) The value of a thorough-bred yearling depends entirely upon "the fashion" of his blood: as much as 3,000 guineas have been given, and 1000 and 1500 are by no means extravagant rates for promising colts. The training of the young racer commences in his second year, when he is placed under a trainer, in an establishment such as those at Newmarket, Middleham, Richmond, Malton, Ilsley, Epsom, etc., where the downs offer a wide expanse of open country for exercise. The trainer's charge is two guineas a week; and for this each horse is personally attended to and ridden by a lad specially attached to him. A thorough preparation for a great race is a long and troublesome operation, consisting of several stages, during which the colt is gradually brought from a naturally loose condition to the greatest perfection possible: first by steady and continuous walking exercise, then proceeding by gradual stages to gentle galloping and sweating, and finishing by testing the capacity of the colt against a competitor at a distance equal to the forthcoming race. It has been found that, practically, the speed of almost all horses can be equalized by addition or subtraction of weight to be carried when running; and so nicely is this adjusted that the handicaps (q.v.), arranged on this principle, provide some of the best races in the year. The Chester cup, Doncaster cup, Ascot cup, Goodwood cup, Liverpool cup, Cezarewitch and Cambridgeshire stakes, are all run on these terms. For the great prizes of the turf, however, the 1000 and 2,000 guineas, the Derby (about £6,000), Oaks (about £4,000), and St. Leger (about £5,000), for three-year-olds, the horses run upon an equality of age and weight.

Enormously large as are the stakes run for—upwards of £200,000 annually—this is as nothing to the money which annually changes hands in betting. We may divide betting-men into two classes—those who back a single horse, from judgment or private information; and those who, without any knowledge, but from mere calculation, estimate the odds, and take the "field" against "any favorite." The latter class are the professional betting-men ("the ring"), who devote themselves to the pursuit; the former is composed of the owners of horses and their friends, who trust to their knowledge and tact. Colossal fortunes have been made by the "ring" in this way, and there are men perpetually attending the country races, and ready to lay against any horse and "back" the "field." As no debts incurred by betting are recoverable by law, they become debts of honor; and any "defaulter" is only amenable to the regulations of the turf, which have been devised to insure, as far as possible, honest dealings. The Jockey Club is the great tribunal of sport in England, and its regulations are adhered to all over the country: it is composed of 64 noblemen and gentlemen, who take an interest in the turf. Newmarket heath, the great center of racing, is in its possession, and by virtue of the position and authority of its members, it is enabled to exercise a great check upon dishonesty and fraud. The seven annual race-meetings at Newmarket are as follows: The Craven, first Spring, second Spring, July, first October, second October, and the "Houghton." The principal races are for the 1000 guineas, 2,000 guineas, Cezarewitch, and Cambridgeshire. The Epsom meeting is the most popular, from its nearness to London, and from the interest attaching to the races for the Derby and Oaks. After Epsom, the Doncaster St. Leger, for three-year-olds, claims the position of greatest interest; it is run for by the competitors in the previous Derby and Oaks, and is generally considered to be a test of the correctness of their results. Ascot is reckoned the most fashionable meeting in the year; it is held on Ascot heath, in Berks, and here the best horses in England compete, at a more mature age than at other races. In the race for the Ascot cup in 1854, West Australian ran the 2¼ m. in 4 minutes 27 seconds, the fastest race on record. Goodwood meeting, which is held in the duke of Richmond's park, in Sussex, is also popular. There are upwards of 150 race-meetings held annually in the United Kingdom; upwards of 1600 horses run at these, and 160 jockeys are in constant employment. A good jockey is considered so valuable that he is always retained by one or more masters, for a considerable sum, and these gentlemen have a call upon his services in a certain rotation. The regular pay of a jockey is £5 for a winning and £3 for a losing "mount;" but there are so many gratuities, that this gives no indication of the income of a jockey, which is often very large: £1000 has frequently been given by a grateful owner. Racing has become popular in France, Russia, Austria, Prussia, Sardinia, and in the British colonies of India, Australia, the Cape, and Canada.

In addition to the flat-racing in England, there are a great number of steeple-chases, where horses contend over natural and artificial fences, ditches, etc. The sport is dangerous, on account of the immense speed arising from competition, so that horses get too distressed to jump, and broken backs and ribs are the consequence. In America trotting-matches are very popular, and their horses excel all others in that description of racing.

HORSE-RACING (*ante*). The racing of one horse against another is probably coeval with their subjection to the use of man, but racing as understood at the present time is of comparatively recent date. Something like jockeyship, however, was prac-

ticed in very early times, the Greeks having introduced it at their celebrated games. In the 33d Olympiad they had their race of full-aged horses, and in the 71st Olympiad a race for mares called the Calpe was instituted. In the 131st Olympiad a race for under-aged horses was established, but we are left in doubt as to the weight the horses carried, or the distance they ran. Alexander the great is said to have been ambitious of obtaining the Olympic crown, and although Macedonians were excluded, the Elean jockey club allowed him to start; but he did not win. Themistocles objected to Hiero, king of Syracuse, as a tyrant, and proposed that the magnificent pavilion containing his race-horses should be pulled down, but the objection was overruled, and he became a winner. Horse-races were known in England in very early times. An old black-letter pamphlet, containing the poetical legend of sir Bevis of Hampton, mentions Whitsuntide as a season of the year at which races took place, and goes on—

> Whiche horse that best may ren
> Three myles the course was then,
> Who that might ryde him shoulde
> Have forty pounds of redy gold.

That horse-racing was commonly practiced at Easter is proved by the fact that, in the 17th c., it was prohibited "as being contrary to the holiness of the season." Fitz-Stephen, in the days of Henry II., mentions the delight taken by the citizens of London in the diversion. James I. made the sport a royal amusement, and set the example of paying large prices for foreign horses of supposed superior breed. Croydon in the south and Garterly in the north were celebrated courses. In the reign of Charles I. races continued to be held, the most noteworthy being the meetings in Hyde park and at Newmarket. The precedent was established of giving as prizes silver cups, instead of coin. Charles II. encouraged the sports of the turf, and under his reign they became national in England. The Godolphin Arabian, the progenitor of the best blood, appeared in the reign of George II. In the commencement of that of George III., Eclipse was foaled, and at that time racing, as now understood, was really established. The first racing calendar is said to have been published by John Cheney in 1727. The most eminent races in England are those at Newmarket, established in 1667, and at Epsom, inaugurated about 1711 by Mr. Parkhurst, and which were made annual after 1730. The earl of Derby began the "Oaks" in 1779, it being so called after his seat in the neighborhood. The Derby, which was first won by Diomed in 1780, generally takes place on the Wednesday in the week preceding Whitsunday. The winners from 1876–79 were Kisber, Silvio, Sefton, and Sir Bevys. In 1880 it was won by Bend Or in 2 minutes 46 seconds, the course being a mile and a half in length. The Ascot meeting is the next great racing festival after the Derby, and was begun in 1727 by the duke of Cumberland, uncle to George III. The St. Leger stakes were founded at Doncaster in 1776. The races at Goodwood were first held in 1802. The Jockey Club, which now chiefly regulates races and the betting connected with them, was founded in 1750. Flying Childers, bred in 1715 by the duke of Devonshire, was the fleetest horse that ever ran at Newmarket. He ran 4 m. in 6 minutes and 48 seconds. Eclipse, the fleetest horse in England since the time of Childers, was never beaten, and died in 1789, aged 25 years. The grand prize of Paris, for which the best English and continental three-year-olds compete, was established by Napoleon III. Since 1856 there has been a race-course at Longchamps, within an easy drive of the capital.

It will be some time before horse-racing in America attracts the attention or assumes the importance that it has done in England. Nevertheless, racing is fast becoming a national sport. Jerome park, in Westchester co., N. Y., is the American Epsom downs. The arrangements are complete, and may challenge comparison with any of the great race-courses of Europe. It was opened in 1866, and under Mr. Jerome's leadership the club in connection with it have made racing agreeable and respectable, and the presence of ladies from New York assures for it the character of a popular and reputable recreation. The Brighton Beach fair-grounds at Coney island, an enterprise which was started a few years ago at a cost of $300,000, furnishes one of the best courses in the country, and is certain to obtain popularity. There are also excellent races at Monmouth park near Long Branch, Sheepshead bay and Saratoga Springs, N. Y., Point Breeze park of Philadelphia, Lexington, Ky., Baltimore, Louisville, New Orleans, Rochester, Buffalo, Chicago, Boston, Springfield, Hartford, and at many other places.

The trotting horse of America is a really distinct variety of the equine race. Hiram Woodruff developed the breed and made it famous. The best American trotters are descended from an imported English horse named Messenger, of which Mr. George Wilkes said, in an often quoted passage, that "when Messenger came charging down the gang-plank of the ship which brought him over, the value of not less than one hundred millions of dollars struck our soil." Hambletonian was the grandson of Messenger, and it is asserted that if he had been broken and trained as a trotter, his own name would have gone down to posterity in company with that of his son Dexter, Flora Temple, Lady Suffolk, Goldsmith Maid, and other animals capable of the greatest achievements on record. In 1874 Goldsmith Maid trotted a mile in harness in the surprising time of 2 minutes 14 seconds, beating the record of Dexter by 3¼ seconds. This great performance was eclipsed in 1878 by Rarus, who trotted a full mile at Buffalo in 2 minutes 13¼ seconds, and by St. Julien in 1879, who trotted a mile at Oakland, Cal.,

in 2 minutes 12¾ seconds, improving this record in 1880 at Hartford, Conn., to 2 minutes 11½ seconds. But the fastest time in the records of the turf is that of Maud S., who startled the racing community by trotting a mile at Chicago, Sept. 18, 1880, in 2 minutes 10⅝ seconds. One mile has also been trotted in less than 2 minutes 17½ seconds, the best time of Dexter, by the following horses: Smuggler, 2:15½; Great Eastern, under saddle, 2:15⅝; Hopeful, to wagon, 2:16½; Lula, 2:16½; Occident, 2:16¾; American Girl, 2:16¾; Gloster, 2:17. The best time in harness, for 2 m., is 4 minutes 48½ seconds, made by Steve Maxwell at Rochester, N. Y., Aug. 10, 1880, beating the record of Flora Temple by two seconds and that of Dexter by two seconds and a half.

It is but a short time since thorough-bred racing has become a formidable rival in America to the national sport of trotting. The public interest, however, has been awakened by the brilliant triumphs of Mr. Lorillard's Parole, beating in 1879 English horses upon their native heath. Ten Broeck has made the excellent record of 1 m. in 1 minute 39¾ seconds; 2 m. in 3:27½; 3 m. in 5:26½, and finished 5 m. in 7:15¾. The celebrated steeple-chaser Trouble is the best cross-country horse that has appeared in this country for many years. Among many other fine race-horses are General Philips, Vera Cruz, Duke of Magenta, Tom Ochiltree, Cloverbrook, Mollie McCarthy, Bob Wooley, and Tom Bowling. During 1880 the best records of previous years have been beaten by Bramboletta and By-the-Way running ⅝ m. in 1:2½; by Barrett and Knight Templar running ¾ m. in 1:14; by Blackburn running 1½ m. in 2:34, and Monitor finishing 1¼ m. in 3:2¾. See DERBY DAY, *ante*.

HORSE-RADISH, *Armoracia*, a genus of plants of the natural order *cruciferæ*, differing from scurvy-grass (*cochlearia*) chiefly in having the valves of the seed-pouches destitute of prominent nerves. The species are perennial herbaceous plants, having erect stems and white flowers, and roots remarkable for their pungency, which is owing to a volatile oil, of very powerful odor, believed to be identical with the volatile oil of mustard. The COMMON HORSE-RADISH (*A. rusticana*) has long cylindrical white roots, stems about 2 ft. high, large, much-veined, oblong, crenate root-leaves on long stalks, and elongate-lanceolate stem-leaves. It grows in damp meadows in the middle and s. of Europe, is naturalized in some places in Britain, and is cultivated for the sake of its roots, which are scraped or grated down and mixed in salads, or used as a condiment with roast-beef. Horse-radish root is used also in medicine as a stimulant, and is often useful in promoting digestion; it is also regarded as an antiscorbutic; and it is sometimes applied externally as a rubefacient instead of mustard. In cultivation, the horse-radish is generally planted very deep. It is very difficult to eradicate from ground in which it has become established, as almost any portion of the root will grow.—Another species, *A. macrocarpa*, a native of Hungary and Transylvania, has much larger flowers, and a rather less pungent root.

HORSE-RADISH TREE, *Moringa pterygosperma*, a tree of the natural order *moringaceæ*, a native of India and Arabia. It has bipinnate or tripinnate leaves, with roundish oblong leaflets, terminal panicles of white flowers, and a pod-like, 3-valved fruit, with roundish 3-winged seeds. The leaves, which are mildly pungent, are used in curries, and with vinegar: the roots, which are very pungent, are used for purposes like those for which the root of the horse-radish is used, from which they are not easily to be distinguished. The seeds yield the useful fixed oil called *oil of ben* (q. v.), and the bark a gum like tragacanth. *M. aptera*, another species of the same genus, also a native of the East Indies, is cultivated in Egypt, Syria, and Italy, for the sake of the oil of ben obtained from its seeds. For the sake both of the pungent roots and of the oil, these trees are now cultivated also in the West Indies.

HORSE-SHOEING. The ordinary system of horse-shoeing is rude and irrational, and is the main cause of most lamenesses and of the majority of falls in riding and driving. Chief amongst its faults are the attempts to fit the foot to the shoe, instead of the shoe to the foot, and the wholesale cutting and rasping, and consequent injury of the several parts of the foot. After the cautious removal of the old shoe, the crust on which it rested generally requires to be pared down with a drawing-knife, and its edge afterwards rounded with the rasp. Any ragged portions of the frog may also be taken off, and this includes the whole of the allowable paring or dressing of the horse's foot. The horny sole intended as a covering and protection of the sensitive parts beneath; the tough elastic frog, an insensible pad which obviates concussion, and preserves the foot wide and free from contraction; the bars, an involution of the crust, which help it to support weight, and give it lateral support, are all too valuable to be ruthlessly cut away, and in all ordinary cases must be scrupulously preserved from both knife and rasp. For sound healthy feet treated as advised, a plain shoe is preferable for saddle or harness horses; the web need not exceed three-fourths of an inch, must fit the crust closely and accurately all the way round to the heels, where its inner edge will rest upon the strong and uncut bars. Nowhere must there be any overlapping, which only renders the shoe more apt to cut the opposite limb, and be torn off in heavy ground. To lessen the chances of tripping, and make the shoe wear equally, it should for the fore-feet be turned up slightly, and its ground surface hollowed out a little at the toe, so as to present the appearance of an ordinary shoe which had been worn for a fortnight or three weeks; and which, as every one knows, is therefore rendered more safe and

comfortable. By turning up at the toe, these advantages are secured at once. For saddle or light harness work three nails on the out- and two on the inside will firmly secure any well-made, well-fitting shoe. The nail-holes should be countersunk, be nearly in the center of the web, and pass straight through it, thus giving the nails a firmer hold of the stout unrasped crust. The points of the nails when driven home should be broken over and laid down with the hammer, but not touched with the rasp. The rasping of the crust which smiths fondly regard as their finishing and polishing stroke, is very injurious, removes the unctuous protecting portion of the crust, and renders it weak, brittle, and liable to crack. Shoes should be replaced every three weeks, or a month at furthest. In shoeing the hind-feet the outside web is generally turned slightly down behind, whilst to give an equal bearing the inside heel is thickened. For heavy draught, both hind and fore shoes should have moderate tips and heels, which enable the horse to exert his full powers without so much risk of slipping. Instead of the five nails used for the lighter horses, seven or eight are requisite.

Horses with weak, tender, or bruised soles may for a time require leather or waterproof pads, but as the sole grows, these should be discontinued, and are never required in healthy feet, where the sole, which is the best and most natural protection, is allowed to grow undisturbed by the knife. Horses with corns should have their shoes made with a wide inside web, which rests upon the bars, or have for a time a bar-shoe. The last nail on the inside should also be dispensed with, and the seat of the corn or bruise carefully pared out, but without injuring either the frog or bars. If, from constant cutting, the bars are unfit to aid the crust in carrying the shoe, it will be often advisable to shoe for a time with tips or half-shoes, keeping the horse as much as possible on soft ground, and waiting the healthy growth of the foot. In troublesome cases of thrush, such tips are also most serviceable, allowing the frog the natural healthy pressure for which it is intended, and with astringents and cleanliness greatly expediting a cure. Groggy horses should have the toe shortened, and turned up, as already advised; the frog and sole must be untouched, and the shoes made light and nicely fitted. Overreach, or cutting of the heel of the fore-foot with the shoe of the hind, is remedied by filing round the posterior edge of the offending toe, and keeping that shoe as far back as possible on the foot. For speedy cut, which is common in horses with in-turned knees, the shoe should be carefully fitted and no projecting portions left; the clinches must also be well hammered down.—Further information may be found in lieut.-col. Fitzwygram's *Notes on Shoeing Horses;* Mr. Miles's pamphlet on *Horse-shoeing,* originally published in the journal of the royal agricultural society; prof. Dick's manuals, and other veterinary treatises.

HORSETAIL. See EQUISETUM, *ante.*

HORSE-TAMING. The taming of horses to increase their value and usefulness has been attempted in all countries where the equine race has flourished. But the credit of first reducing the art to a system belongs to John S. Rarey, whose treatise, originally published in America, and republished in 1858 in England and France, went through a large number of editions, and is still considered an authority on the subject. One of his greatest triumphs was in England over the racing colt Cruiser, which was so vicious that he had killed several grooms, but was completely tamed by Rarey, and afterwards brought to America. The system is founded on a profound study of the disposition of the animal. In contrast with the usual mode of training by harsh words, a sharp whip, and cruel worrying, he demonstrates how easily, quietly, and safely horses may be tamed by kindness.

The education of the horse should be that of the child. Pleasure should be as much as possible associated with the early lessons, while firmness and coercion, when necessary, must establish the habit of obedience.

The first step towards the breaking of a horse is placing a halter upon his head, and can be easily accomplished by a little dexterity and caution. The colt should then be taking to the longeing ground and taught to lead. The large, smooth snaffle, with keys depending from its central ring, is considered by many trainers to be the best bit for mouthing purposes. After the colt has been shod, and has been driven about the roads in reins for a few days to accustom him to shoes, he may be saddled, but at first without stirrup-straps or stirrups, as they act as alarmants. Before breaking a horse to harness he should previously have been well mouthed, and broken to the saddle. The hames and traces should be omitted on the first day, and the harness should be so constructed that the tugs open from above, allowing the shafts to drop into them. The two-wheeled break should be strong and high on the wheels, that the splinter-bar may be high, and so prevent the animal kicking over it. Bearing-reins are useless and cruel, as the horse is made to suffer great pain, and cannot pull to the full extent of his power when his head is kept in a constrained position.

HORSHAM, a parliamentary borough and market-t. of England, in the county of Sussex, is situated on a tributary of the Arun, 28 m. n.e. of Chichester, and 35 m. s.s.w. of London. The court-house, a Gothic edifice; St. Mary's church, in the early English style; and the grammar-school, with an endowment of £412 a year, are the principal institutions of the town. The trade and manufactures are inconsiderable. Horsham returns a member to parliament. Pop. of parl. borough in 1861, 6,747; in 1871, 7,831.

HORSLEY, CHARLES EDWARD, b. England, 1824; studied music in Germany, passing some months with Mendelssohn, and studying under Moritz Hauptman and Spohr. Owing to the failure of his health he went to Australia in 1861, and in 1872 came to New York, where he became organist in St. John's (Prot. Epis.) church. He has published three oratorios, three cantatas, and a number of shorter compositions.

HORSLEY, JOHN CALLCOTT, b. England, 1816; a painter who has produced a great number of works, and is especially successful in genre painting. In 1843 he won a prize for his representation of "St. Augustine Preaching," and was engaged upon the cartoons for the new houses of parliament. Some of his productions are "L'Allegro and Il Penseroso," "Under the Mistletoe," "Caught Napping," "Scenes from Don Quixote," and "Healing Mercies of Christ."

HORSLEY, SAMUEL, an English prelate, was the son of a clergyman of the Episcopal church, and was b. at St. Martin's-in-the-Fields, London, in 1733. He was educated at Westminster school and Trinity hall, Cambridge, where, though he studied hard, and laid in immense stores of knowledge, he took no degree in arts. In 1758 he became curate to his father, then rector of Newington, and shortly after succeeded to the rectory, a living which he held for 34 years, though he also enjoyed in the interval many other preferments. In 1767 Horsley was elected a fellow of the royal society, of which he long continued an active member. In fact, the writings that first brought him into notice were scientific, and not theological. We may mention his *Remarks on the Observations made in the late Voyage towards the North Pole, for determining the Acceleration of the Pendulum, in lat.* 79° 51′ (1774). Two years afterwards, he issued proposals for a complete edition of the works of sir Isaac Newton, which, however, did not make its appearance till 1785. But the grand event in his career was his controversy with Dr. Priestley, which, considering the momentous nature of the subjects discussed, and the splendid talents of the combatants, may be safely pronounced to be the greatest theological contest of the 18th century. The impression at the time was, that so far as hard, merciless *hitting* goes, Horsley had decidedly the best of it. Rude in language, but panoplied in learning, contemptuous, defiant, dictatorial, his attitude reminds one of Goliath rather than of St. Paul, and we cannot but feel that he is, at least, as much inspired by the ambition of the pugilist as by the ardor of the Christian. The work that excited the controversy was Dr. Priestley's *History of the Corruptions of Christianity*, among which corruptions was included the orthodox doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of the archdeaconry of St. Albans, May 22, 1783. Priestley replied the same year in a publication entitled *Letters to Dr. Horsley in Answer to his Animadversions*, etc. In 1784 Horsley retorted in 17 *Letters from the Archdeacon of St. Albans in reply to Dr. Priestley*, etc. These were, in return, met by a new series from Priestley, who, waxing warm with the fight, describes his antagonist as "the incorrigible dignitary." After a silence of 18 months, Horsley again replied in his *Remarks on Dr. Priestley's Second Letters*, etc., and in 1789 collected and published the whole that he had written on the subject. His services were rewarded with the bishopric of St. Davids in 1788, whence he was translated to the bishopric of St. Asaph's in 1802. He died Oct. 4, 1806. Horsley's character as a writer has been already indicated; it remains to be added that as a bishop he was liberal and humane both to the clergy and the poor of his diocese, although vigilant and even strict in the discharge of his episcopal duties. Horsley's works, besides those already mentioned, consist of sermons and treatises on biblical criticism, on mathematics, and on classical subjects. A collected edition of his theological works was published by Longman (6 vols., 1845).

HORSLEY, WILLIAM, 1774–1859; b. England; became a musician of celebrity. He studied under Dr. J. W. Callicott, whose daughter he married. He was the author of many popular glees.

HORTA, a seaport in the Azores, the capital of the island of Fayal; pop. 7,636. It possesses a safe and good harbor.

HORTENSE EUGÉNIE DE BEAUHARNAIS. See BONAPARTE, *ante*.

HORTENSIUS, QUINTUS, 114 B.C.—50 A.D.; b. Rome; famous as a lawyer and an orator, attracting general attention before he was 20 years old. It is said that he was unscrupulous in his efforts to win any cause that he pleaded, and was not above the use of bribery. Although he was the political and legal foe of Cicero, personally the two orators were friends; but at one time Cicero accused Hortensius of duplicity. Hortensius was questor, ædile, pretor, and consul. His private life was luxurious and to some extent immoral.

HORTICUL'TURAL SOCIETIES, associations for the encouragement of gardening, are now numerous in almost all civilized countries, but seem to derive their origin only from the beginning of the present century, when the *London Horticultural Society* was formed, chiefly through the exertions of Mr. Knight, Mr. Wedgewood, and sir Joseph Banks. The society obtained a charter in 1808. The *Experimental Garden* of the society, the first of its kind, was established in 1817, and was removed to its present situation at Chiswick in 1822. The progress of the society was very rapid, and its usefulness has been very great. Societies of the same kind soon began to spring up in Germany and

other parts of the continent of Europe, and horticultural societies now exist in almost all the towns and in many of the villages and rural districts of Britain. The *Prussian Gardening Society* perhaps ranks next in importance to the horticultural society of London; and the *Pomological Society of Altendorf* has been very useful in regard to the cultivation of fruits. The horticultural societies, now so common throughout Britain, have done much to promote not only horticulture, but habits of neatness and a taste for flowers among the humbler classes, of which the humanizing effects have been very manifest and important. It is perhaps to be regretted that their attention has been so exclusively devoted to the cultivation of particular kinds of vegetables already in general use, and of those flowers known as florists' flowers.

HORTICULTURE. See GARDENING.

HORUS, an Egyptian deity, whose name, *Har*, means "the day," or "the sun's path," and is generally written in hieroglyphics by the sparrow-hawk, which was sacred to him. The old derivation from the Hebrew *aur*, light, is now recognized as incorrect. Under the name of Horus were included several deities, as Haroeris (q.v.), the elder Horus, and Harpocrates (q.v.), or the younger Horus; *Har-sam-ta*, Horus, the uniter of the upper and lower world, who was the second son of Athor, resided in Annu, or Heliopolis, and emanated from the eye of the sun (Rosellini, *M. d. c., t.* 47); and *Har-net-ta*, another form of the same god, represented as a boy wearing a triple crown, who existed from the commencement of things, a self-created being, and emanated from the Nu, or firmament; besides several others. But the principal Horus was Horus the son of Isis (*Har-si-hesi*), represented as a naked child standing, wearing a skullcap, or the crown of upper and lower Egypt. Horus is first mentioned by Herodotus (ii. 144, n. 156) as the son of Isis and Osiris, and brother of Bubastis, the Egyptain Diana. Various accounts are given of his birth; he having been, according to one version, engendered of his father Osiris before the birth of Osiris and Isis; or, according to another account, begotten of Osiris after that god's destruction by Typhon. His birth was said to be premature, and he was consequently weak in his lower limbs. In order to avoid the persecution of Typhon, he was brought up by Leto on the floating island of Chemmis, or Buto, in secret. Having grown up, he became *Har-net-atf* (Horus the avenger of his father), and, along with Isis, avenged his father's death (see OSIRIS), according to the best received tradition, vanquishing Typhon and his associates in a great battle at a village near the city of Antæus, on the 26th of the month Thoth, on which occasion Osiris came from the nether world to his assistance in the shape of a wolf (Diodor. i. 21). According to the Egyptian ritual, he cut off their heads for the fowls of heaven, and their thighs for the wild beasts and fishes. Typhon is said to have been delivered bound in fetters to Isis, who released him, upon which Horus tore the diadem off his mother's head, but Thoth replaced it by the head of a cow. Horus was often confounded with the elder Horus by the Greeks, but the monuments represent him as the type of royalty, the antagonist of Set or Typhon, the avenger of his father Osiris, for whom he obtained the corn of Elysium and the waters of Elephantine, conquered the north and south and shared Egypt with Set or Typhon, having held the government of the northern portion as Typhon of the south. After the death of Typhon he became sole monarch, and, as last king of the dynasty of gods, reigned, according to different versions, 100 or 25 years. Numerous esoteric explanations have been given of this god, as that he represents the Nile, as Typhon the desert, the fruitful air or dew which revives the earth, the moon, the sun in relation to the changes of the year, or the god who presided over the course of the sun. He also represented three planets, Jupiter (*Hâraphâta*), Saturn (*Harka*), and Mars (*Harteshr*). The sparrow-hawk was sacred to him; so were lions, which were placed at the side of his throne. There was a festival to celebrate his eyes on the 30th Epiphi, when the sun and moon, which they represented, were on the same right line with the earth. A movable feast, that of his coronation, is supposed to have been selected for the coronations of the kings of Egypt, who are described as sitting upon his throne. When adult, he is generally represented hawk-headed; as a child, he is seen carried in his mother's arms, wearing the pschent or atf, and seated on a lotus-flower with his finger on his lips. He had an especial local worship at Edfou or Hut, the ancient Apollinopolis Magna, where he was identified with Ra, or the sun. There were also books of Horus and Isis, probably referring to his legend (Lucian, *De Somn. sive Gall.* s. 183). The magnet was called his bone; he was of fair complexion.—Birch, *Gall. of Antiq.* p. 35; Wilkinson, *Mann. and Cust.* vol. iv. p. 395; Tablonski, *Panth.* ii. 4, p. 222; Champollion, *Panth. Eg.;* Hincks, *Dubl. Uni. Mag.* xxviii. p. 187; Boeckh, *Manetho,* p. 61.

HORUS, a king of Egypt, named Haremhebi, who reigned at the close of the 18th dynasty. His reign has been placed at 1661, 1455, or 1446 B.C., but it probably fell about 1400 B.C. Although the lists of Manetho give him a reign of 36 or 38 years, no higher monumental date than his 7th year has been hitherto found. He restored the worship of Amen Ra, which had been overthrown by the disk or sun worshipers, and conquered the Barubaru, a tribe of the negroes of Kush or Ethiopia. The most southern point where his monuments have been found is Gebel-Addeh, the ancient Amen-Heri, between the Wady Halfa and Ibsamboul. He also embellished Luxor and other quarters of Thebes. Fine statues of this monarch exist at Turin, and others in

the British museum.—Brugsch, *Geographie des Alten Ægyptens;* Champollion-Figeac, *L'Egypte*, p. 319.

HORVAT, ISTVÁN (Stephen), the Hungarian Varro, was b. at Stuhlweissenburg, in 1784. From early youth to his death in 1846, Horvat consecrated all his rare abilities to historical research, with the double object of settling the question as to the origin of the Magyars, and of consolidating Hungarian nationality through the scientific development of the Hungarian language. Among Horvat's published works, the chief merit belongs to his *Magyarország Tösgyökeres Régi Newzetségeiröl* (Primitive Families of the Hungarians, Pesth, 1820), an 8vo vol. of moderate size, but the materials for it have been gathered from innumerable rare manuscripts, and other documents, partly foreign, partly domestic. It is a monumental work in genealogy, connecting some of the living Hungarian families with the chieftains who came with Arpád at the end of the 8th century. In 1814 appeared at Pesth, *Defense of the Kings Lewis the Great and Mathias Corvinus;* in 1821, two vols. of *Answers to the Questions on Philology, put by the National Museum at Pesth;* in 1825, *Sketches from the Oldest History of the Hungarian Nation;* in 1828 and 1829, *Researches on Biblical Expressions*, etc. Horvat was for many years editor of, and later, chief contributor to the *Tudom ányr Gyüj temény*, or Scientific Magazine.

HORVÁTH, MIHÁLY, b. Hungary, 1809; took holy orders in 1830, and in 1844 became professor of the Hungarian language and literature at Vienna. At the time of the revolution in Hungary he was minister of public worship and education; after its suppression he was expatriated until 1866, when he obtained permission to return to his native country. He is the author of a *History of Hungary.*

HOSACK, DAVID, LL.D., 1769–1835; b. New York; graduated at Princeton in 1789; studied in Europe, and in 1795 was chosen professor of botany in Columbia college, and in 1797 of materia medica. In 1807 he became professor of materia medica and of midwifery in the college of physicians and surgeons, then newly founded, and subsequently of the theory and practice of physic, and of obstetrics and the diseases of women and children. He was the founder of the first botanic garden in the U. S. He was concerned with Drs. Mott, Macneven, and Francis in organizing the medical department of Rutgers college, at New Brunswick, N. J. In New York city he filled various medical offices in asylums, hospitals, and for the city in general. He was also one of the originators and for 12 years president of the New York historical society, and was a fellow of the royal society of Great Britain.

HOSANNA, a Hebrew word, meaning *Save, we pray.* At the feast of tabernacles the Jews carried branches of the palm and myrtle tree, repeating verses 25 and 26 of Psalm cxviii., which begins with hosanna. The expression became a term of acclamation, and was applied to the prayers of the several days during which the feast lasted. The feast itself was called the Great Hosanna, and the term was more especially applied to the seventh day of the feast.

HOSE'A, the third (in the order of time) of the twelve minor prophets of the Old Testament, delivered his prophetical message, according to the inscription of his book, during the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah, and of Jeroboam II., king of Israel. Reckoning even from the last year of Jeroboam's reign (about 785 B.C.) merely to the first of Hezekiah's (about 725 B.C.), his career must thus have extended over nearly 60 years; but most—especially of modern scholars—seem inclined to regard this period as improbably long, though some calculations (e.g., Horsley's) make it even longer. Whether Hosea belonged to Judah or Israel, cannot be determined with certainty; but the greatest critics, with the exception of Maurer, maintain him to have been an Israelite. His prophecies, which are mainly directed against Israel, give a frightful picture of shameless idolatry, licentiousness, intemperance, falsehood, and eager inclination towards disadvantageous and demoralizing foreign alliances, and they may be regarded as appropriate to the period of anarchy and vice which followed the luxurious reign of Jeroboam II.

HOSEA, BOOK OF (*ante*). The term of 55 or 60 years from the latter part of Jeroboam II.'s reign to the first part of Hezekiah's, spoken of as marking the continuance of Hosea's prophetical office, though long, is not improbable or at all unprecedented. The style of the book has been described by critics as pointed, energetic, and concise. Jerome admired it for its great condensation and consequent brevity. But these very qualities in so ancient a writing often make the particular meaning obscure even when the general drift is plain. In so small a book, remaining as the only representative of so long a life's work, and recording prophecies that have no marks to distinguish the times of which they treat, it is not surprising that many passages are hard to be understood. The scope of the book is to reprove the nation generally, and the ten tribes in particular, for their gross idolatry and other aggravated sins; to foretell the rejection and captivity of Israel if they persisted in their evil, and to call them to repentance with promises of future restoration and ultimate conversion. The 14 chapters admit of being divided, somewhat more particularly, into five parts: I. i.—iii. The spiritual unfaithfulness of Israel is figuratively represented; yet a remnant of them, it is promised, shall be saved; consequently they are exhorted to forsake idolatry. Prom-

ises follow concerning their conversion to faith in the Messiah, and the gracious purposes of the Lord towards them are figuratively set forth. II. iv.—vi. 3. The prophet condemns the bloodshed and idolatry of Israel, and warns Judah against pursuing a similar course. He threatens divine judgments upon the priests, princes, and people; yet holds out promises of pardon expressed emblematically by the morning, the rain, and the resurrection, with remote reference to the resurrection of Christ on the third day. III. vi. 4—viii. The prophet utters God's complaint concerning the obstinate idolatry and other sins of the people, and says that, notwithstanding their reliance on Egypt, they shall be carried captive into Assyria. IV. ix.—xiii. 8. The captivity and dispersion of Israel are again foretold. The people are reproved for their idolatry, yet are not to be utterly destroyed. Their return to their own land is promised, even while threatenings against their idolatry are renewed. V. xiii. 9—xiv. After denunciations of divine judgments mingled with promises of deliverance from captivity, the prophet exhorts Israel to repentance, furnishes them with a model of prayer adapted to their situation, and foretells their abandonment of idolatry together with their subsequent restoration and conversion.

HOSHUNGABAD', a t. in central India, stands on the left or s. bank of the Nerbudda, in lat. 22° 44′ n., and long. 77° 44′ east. Pop. '72, 11,613. It is a town of considerable commercial importance, and is the capital of a district of the same name in the Central Provinces, which has an area of 4,222 sq.m., with a pop. of 440,186. Besides being so fertile as to be styled the garden of the country, it possesses abundance of excellent coal.

HO'SIERY, in its most limited sense, refers to the manufacture of stockings (hose); but in its more general application it comprises all knitted goods, whether made by hand or by machinery. The use of stockings originated in the cold countries of the north, and probably the first were made of skins, and subsequently of cloth; they were also, until a comparatively late period, made all in one piece with the trousers, constituting the trunk-hose of our ancestors; but these garments were separated; and the art of knitting was invented, it is supposed in Scotland, about the commencement of the 16th century. Certain it is that knitted stockings found their way to France from Scotland, and led to the establishment of a guild of stocking-knitters, who chose for their patron saint St. Fiacre of Scotland. In 1589 William Lee, of Woodbridge, Nottinghamshire, entirely altered the hosiery trade, by inventing the knitting-frame; and although he did not live to enjoy much benefit himself from it, it soon became a very important aid to the commerce of this country. During the protectorate, the stocking-frame knitters obtained a charter, and extended their operations through the provinces of England, but with all the disadvantages of a monopoly, which eventually led to legal proceedings, by which the charter was set aside in 1753. Since that time, many improvements have been made in the stocking-frames, and it may be fairly said that four-fifths of the stockings now worn through the world are made by the manufacturers of Great Britain. The ingenious contrivances by which this vast work is produced will be described under STOCKING-FRAME.

Stockings are made of cotton, of worsted, or of cotton and worsted mixed, called angola, and of silk. They are each made of two distinct kinds. The best are made in a flat web, which has to be sewn at the back as well as the foot, and it is so made that when the two edges are brought together at the back, they give the form of the calf. The common or *racked* stockings are woven in a circular frame, and form a cylindrical web of equal width from top to bottom; these have to be stretched on boards to give them the shape, and are ironed with hot irons whilst on the board, to make them retain the shape of the board. The foot is formed by cutting the web and adding a small piece for the sole. Nottinghamshire, which gave birth to the inventor of the stocking-frame, is still the center of the hosiery trade in Great Britain. At Belper, in Derbyshire, stockings of very fine quality are produced; but the cheaper sorts of stockings, gloves, singlets, etc., are made in Nottingham or its immediate neighborhood.

HOSIUS, "THE SAINT" (256–359), b. either in Egypt or Spain, became bishop of Cordova about 296 A.D., and retained the office more than 60 years. He was a member of a council held at Elvira, near Granada, about 305. Having suffered persecution during the reign of Diocletian and Maximian, he was greatly honored for his steadfast faith. He is said to have contributed to the conversion of Constantine by showing him that Christianity excelled heathenism in being able to grant forgiveness even to the greatest sinners. The emperor afterwards continued strongly attached to him, and in 324 sent him to Alexandria to mediate between the bishop of that city and Arius, as well as to settle the dispute concerning the observance of Easter. His mission having proved too hard for him, in the following year the council of Nicæa was called for the purpose of considering both subjects. Of this council Hosius was either the president or, at least, one of its presiding officers. Baronius claims that he was also the pope's legate; this claim, however, is generally denied, with the admission that through his exalted character and great influence in the west he perhaps in some degree unofficially represented the pope. At the close of the council he drew up or, as some say, announced the decree, signed it first and prevailed on the emperor to sanction it. He was president of the council of Sardica, called in 347 by Constantius and Constans at the desire

of Athanasius. In 355 Constantius requested him to join in condemning Athanasius, but, instead of doing so, Hosius earnestly defended that zealous champion of the orthodox faith. Having persisted in this course a second and even a third time, he was, at the close of the year, banished by the emperor. Two years afterwards he was summoned to attend the council of Sirmium, where, worn out with extreme age and hardship, he was prevailed on to sign a document favoring Arianism, yet he steadfastly refused to condemn Athanasius. Having then been allowed to return to his home and office, he died two years after, at the age, probably, of about 103 years. Athanasius and Augustine extol his character, and attribute his partial and late compliance with the imperial demands to the infirmity of age.

HOSMER, HARRIET, an American artist, was b. at Watertown, Mass., in 1831. As she had a feeble constitution, her father, a physician, encouraged her to strengthen it by outdoor exercises, and she became an adept in shooting, riding, rowing, skating, and swimming. She also showed a talent for sculpture by modeling figures in clay. To prepare herself for her chosen career, she studied anatomy, first with her father and afterwards at the medical college at St. Louis. Returning to her home in 1851, she modeled her first work, "Hesper," which had so decided a success that she was sent to Rome, where she became the pupil of Gibson. In his studio she modeled busts of "Daphne" and "Medusa," and a statue of "Œnone" and the much-admired statue of "Beatrice Cenci" for the mercantile library of St. Louis. Copies of her statue of "Puck," of which there are about 30, were ordered by the prince of Wales and the duke of Hamilton. Her most ambitious work is a colossal statue of "Zenobia in Chains." The "Sleeping Faun," exhibited in Paris in 1867, is one of her best works.

HOSPICE, the name given to the pious establishments kept up by the monks on some of the Alpine passes, for the purpose of affording assistance and shelter to travelers. The oldest of these is that on the great St. Bernard (see BERNARD, GREAT ST.), which the priests of the canton of Valais gained possession of in 1825, and afterwards fitted up in a comfortable manner. A hospice likewise existed on St. Gothard as early as the 13th century. At present, however, it is inhabited not by monks, but by a hospitaler, who entertains travelers gratis, and accepts no remuneration beyond a present. Similar establishments are found on Mont Cenis, the Simplon, and the little St. Bernard.

HOSPITAL, in law, is used in England to denote an eleemosynary corporation founded for the purpose of supporting certain descriptions of persons; whereas in Scotland it more frequently signifies a mortification or endowment for the education as well as support of children. In both countries it is also used, popularly, to denote an institution for dispensing medical assistance to the poor gratuitously.

HOSPITAL, DAMES OF THE. See SISTERS OF CHARITY.

HOSPITALERS, charitable brotherhoods founded at various times and in different countries, for the care of the sick in hospitals. The vow to devote themselves to this work of mercy is, in all these brotherhoods, superadded to the ordinary vows of poverty, chastity, and obedience, which are common to all the religious orders in the church of Rome. One of the earliest recorded instances of a hospital served by such a brotherhood is that of Constance in the 13th century.

The knights of St. John (q.v.) of Jerusalem, as also the Teutonic knights (q.v.), were originally hospitalers. The hospitalers of Our Lady of Christian Charity were founded near Chalons in the end of the 13th c. by Guy de Joinville; a similar body at Paris in 1294; and the hospitalers of Our Lady Della Scala about the same time at Siena. The history of the brethren of mercy, founded by ST. JOHN OF GOD, will be found under that name. There are many other local institutes or congregations, all of which, however, recognize the same general rules and follow the same general organization.

HOSPITALS are so called from the mediæval *hospitia*, or more properly the class of hospitals established very generally for the reception and relief of lepers, whose malady was one of the scourges of Europe. These leper hospitals were very commonly in England and in Scotland called "spitals;" hence the frequency of such names of places as Spital, Spitalfields, etc. The leper hospitals, and other kinds of the old hospitia, disappeared with the improvement of society, and substitutes for them on a broader scale began to be established in the modern form of hospitals. Of public establishments under this general designation there are now, as is commonly known, three distinct classes—hospitals for the reception and treatment of the sick and hurt, hospitals for the board and education of children, and hospitals for the reception and permanent board of poor old persons of both sexes. Hospitals of these several classes are numerous and on a munificent scale in Great Britain, where they take the position of leading charities in the country. As, in the present work, the more remarkable hospitals receive some notice under their respective heads, we need here only offer a few general observations.

HOSPITALS for the sick and hurt are in some parts of England and Scotland termed infirmaries. Under whatever designation, institutions of this kind are now established in all parts of the civilized world, supported, as in England, on a principle of charity, or, as in France, chiefly from the funds of the state or the civic municipalities. The primary or more important object of all such institutions is to mitigate bodily suffering, whether that arises from natural or accidental causes, in which respect they are indis-

pensable as a refuge to all who are unable to pay for private medical or surgical aid, or as a convenient means of succor on emergencies to persons of every rank and degree of opulence. While such is the main object of these benevolent institutions, they are in numerous instances serviceable as schools for medicine and surgery; as such, no university at which these and kindred branches of learning are taught can be said to be complete without the adjunct of a well-organized hospital, where professors can practically educate their pupils by pointing out varieties of disease and injuries, and exemplifying methods of treatment. Hence the best specimens of hospitals are found in university towns—as in London, Paris, Edinburgh, and some other cities famed as schools of medicine and surgery. The older of the London hospitals are St. Thomas's, 1553; St. Bartholomew's, 1546; and Bethlehem, 1547. A considerable accession to the number took place in the reign of George II., when society became alive to the value of such institutions. It was at this period that the royal infirmary of Edinburgh was established (1736). The antiquity of British hospitals sinks into insignificance in comparison with that of some institutions of this kind on the continent. The Hôtel Dieu in Paris, which is alleged to be the most ancient hospital in Europe, was founded in the 7th c., and, long known as the Maison Dieu, received the benefactions of successive sovereigns. It is now conducted on a stupendous scale. Houses of this kind in France usually receive valuable aid from a religious sisterhood renowned for its practical benevolence, the sisters of mercy. A striking example of these women's unselfish and useful labors is furnished at the great hospital for the sick and hurt at Lyons, where the entire establishment —cooking, nursing, dispensing medicine, etc.—is gratuitously conducted by them.

In London, Paris, and other large seats of population the pressure for admission by patients, and likewise the necessity for classifying and properly attending to large numbers, have led to the establishment of hospitals for special departments of medical practice. Thus, besides the general hospitals, there are now lying-in hospitals, ophthalmic hospitals, consumptive hospitals, children's hospitals, etc.—each with its peculiar accommodation, and its appropriate staff of officials. Independently of these, there are hospitals for the treatment of mental maladies, of which Bethlehem and St. Luke's in London, and the establishments in Paris known as hospices, are examples. To this class of institutions belong lunatic asylums (q. v.), also asylums for the reception and treatment of naturally imbecile children; these last, though in operation for some time in France and Switzerland, being but of recent establishment in Great Britain. To all these institutions under civil administration are to be added those hospitals which are maintained by the English, French, and other governments for the military and naval services.

No part of the social economy of European countries is so perfect in its organization, so purely humane, and so unobjectionable on the score of promiscuous charity, as the institution of public hospitals or infirmaries. As means of relief and schools of medicine, they appear to be absolutely essential to every dense community; not the least of their valuable qualities being that, by their prompt and liberal action, they interpose to stem contagious distempers which, if unchecked on their outbreak, might visit and decimate families who are far removed above the need of gratuitous medical attendance. On this latter ground, as well as from sentiments of benevolence, the hospitals or infirmaries of England, Scotland, and Ireland are the objects of much solicitude to the general community; it being customary for wealthy individuals to bequeath sums towards their support, and for public subscriptions and church collections to be made for them annually. In some cases, besides the infirmaries so miscellaneously sustained, hospitals are erected and maintained wholly by endowment.

A leading peculiarity of medical hospitals is their good order and cleanliness. They are mostly large edifices, and though, in a sanitary point of view, best placed in airy situations, they are for the sake of convenience usually situated in the neighborhoods where they are particularly required. Internally they are arranged in wards, each under its own nurses, with general superintendents and a suitable body of servants. Being open night and day to receive pressing cases, there is a resident surgeon with assistants constantly in attendance. Scrupulous cleanliness, quiet, decorous conduct, exclusion of intoxicants and of miscellaneous visitors, are among the points principally attended to by the managers.

The Middlesex hospital, parish of Marylebone, may be taken as a fair specimen of a general hospital in England. It is a large building, disposed in the form of the letter H, which admits of thorough ventilation in all the passages. It comprehends 310 beds, of which 120 are for medical and 190 for surgical cases. Three wards are set apart for the reception of 26 poor women affected with cancer, a class of cases when seemingly incurable not usually admitted into general hospitals. The staff consists of three physicians, who take charge of the medical cases in the wards; a physician-accoucheur, who devotes himself to the diseases peculiar to women and infants, and who superintends the working of the maternity department; four surgeons, who take charge of the surgical patients; and assistant physicians and surgeons, who take care of out-patients. Resident house-surgeons and an apothecary with assistants attend to all emergencies in the absence of physicians and surgeons, and summon them if necessary. Attached to the hospital are a chaplain and secretary. The physicians and surgeons, who give their services gratuitously, act as professors in the medical college. The management is conducted by governors and a medical and weekly committee. In- and out-door patients are admitted by

letters of recommendation from governors or subscribers to the funds, but in cases of cancer and diseases of the eye, and in cases of emergency, the recommendation is dispensed with. The annual number of patients received into the hospital is about 2,100, and 18,000 receive attendance at their own homes. No lying-in patients are now admitted into the hospital, but about 800 poor women are yearly delivered at their own dwellings, by pupils and midwives, under the direction of the physician-accoucheur. The total expense incurred is less than £11,000, of which more than a half is from endowment, and the remainder from subscriptions, donations, legacies, and miscellaneous collections. A separate fund is provided to assist poor patients leaving the hospital who may be deficient in clothing or other necessaries.

As in some degree allied or auxiliary to hospitals, there are two kinds of establishments deserving notice. The first to be mentioned are public *dispensaries*, where, at stated hours, medical advice and medicines are given gratis to applicants; and though like other forms of charity liable to abuse, it is allowed that these institutions are of much value in the midst of poor communities, and also, like hospitals, are a means of staying the course of contagious distempers. The other institutions to be noticed are those called in France *maisons de santé*. These establishments are private hospitals for the reception and treatment of patients who are able and disposed to pay a small sum for board and medical or surgical attendance. A common charge is from three to five francs a day. Under the name of *sanatorium*, an attempt has been made to introduce this kind of institution into England, where, however, from various circumstances, including the generally good home-accommodation of the middle and sub-middle classes, the institution has not become so popular as it is in Paris.

Hospitals for the board and education of the young are more varied in character and more numerous in Great Britain than in any country in the world. Consisting for the most part of large and handsome buildings, placed in salubrious situations in the environs of cities, some are specially adapted for boys, some for girls, and less frequently they are for both; some are maintained by endowments from deceased benefactors, some by funds connected with trade incorporations, and some by casual donations and subscriptions. The oldest, and those on the most munificent scale, are of the class first mentioned; as, for example, Christ's hospital, London, and Heriot's hospital, Edinburgh. Donaldson's hospital, Edinburgh, belongs to this class; and so likewise does the Girard college, Philadelphia, which, costing for construction nearly two millions of dollars and giving accommodation to upwards of 300 orphans, is not excelled in point of architectural grandeur, or in munificence of private endowment, by any European hospital for children. In the whole of this class of institutions in Great Britain there is a similarity of arrangements. The inmates are assumed to be orphans, or the children of parents in reduced circumstances; they are admitted at about 6 or 7 years of age, and kept till about 14; they receive gratuitous board and education within the establishment; and they wear a uniform according to the fancy of the directors—the dress being in some instances in England antiquated and ridiculous. There is ordinarily a keen competition among parents and guardians to procure the admission of children into these hospitals, for the benefit to be secured is deemed equal to a gift of £200 to £500. Hence, as may be supposed, the charity, to call it so, is frequently abused. As residence within such establishments for a period of 6 or 7 years, interrupted only by holidays, involves a withdrawal to that extent from the family circle, serious objections have lately been taken to the marked and necessary deficiency of hospital training. On this ground, as well as from their pauperizing tendency, hospitals for children are suffering in public estimation; and extended in number beyond all reasonable bounds, as they are in Edinburgh and some other places, are remonstrated against as being inconsistent with a sound social economy.

Hospitals for indigent old men and women are found in several European countries, but nowhere are they so common as in Great Britain and the Netherlands, where begging is rigorously proscribed by the police, and almsgiving assumes the character of rates for support of the poor. The workhouses for the reception of parish paupers are the humblest variety of these hospitia, though as seen in some parts of England and Scotland they are on a vast scale of accommodation, adapted to the wants of unions or clusters of parishes. Considerably above these in point of comfort and liberality of management are the hospitals endowed by individuals or by incorporations for persons who once occupied a respectable position and have through misfortunes lapsed into decayed circumstances. Almost every city of any note in the United Kingdom has one or more of this species of hospital; the claim for admission being ordinarily a privilege of local burgesses or members of incorporated crafts. Analogous to this class of institutions was Greenwich hospital, for superannuated mariners connected with the royal navy, and the military hospital, Chelsea. In England there are numerous establishments called almshouses. These are of the nature of hospitals for indigent men and women of respectable character, but with this difference, that instead of all living in wards under one roof, the inmates are each provided with a small dwelling for him or herself, and receive the means of separate livelihood. These establishments, consisting of clusters of neat small cottages in contiguity, or of separate dwellings grouped in the form of a spacious building, abound in London and its vicinity, where they afford pleasing examples of the munificence of opulent benefactors and incorporated city

companies. At St. Cross, near Winchester, and at Coventry there are almshouses curious from their antiquity and external appearance. The noblest example of this class of institutions is the Charter-house, London, described in the present work.

HOSPITALS, MILITARY, establishments for the reception of the sick and wounded of an army. The smallest is the regimental hospital, under the medical officers of the regiment; next, there is the divisional hospital, presided over by staff medical officers, for the benefit of all the corps in the division; and, lastly, there is the general hospital, applicable to the whole force. In these hospitals the medical officers are responsible directly to the secretary of state for war for all purely medical functions. With regard to discipline, inspections, and other military duties, the principal medical officer is responsible to the commandant of the regiment or division, who in his turn is answerable to the general-in-chief for the state of the hospitals in his command. Soldiers while in hospital are subjected to a stoppage of 7d. a day from their pay, unless in hospital on account of wounds received in action or on service in the field; but their whole pay is stopped if detention in hospital be certified to have become necessary from their own misconduct. There are several large military hospitals at home—e.g., Netley (q.v.); fort Pitt, for lunatic soldiers; Woolwich, etc. In the French army the service of the field hospitals forms part of the intendance of the army, the medical officers in charge being under the supreme control of the intendant-general.

HOSPITALS, MILITARY (*ante*). The principles of hospital construction were pointed out by a commission of the French academy of sciences in 1778, and improved in several details by Miss Nightingale, Galton, and others, and in the late American and Franco-German wars. The general principles may be gathered from the following directions. The most important part of a hospital is the ward; that is, the special apartment, or system of apartments, for the reception and care of the patients. It should, if large, be arranged in separate pavilions of one, or at most not more than two stories. These buildings should be about 25 ft. wide, 14 ft. high, and of a length allowing not less than 100 square ft. per bed. In warm climates the height should be greater, and also the floor-space, allowing at least 120 sq. ft. per bed. No one ward should contain more than 32 beds. The windows should be opposite, reaching from 3 ft. above the floor to one foot from the ceiling, and occupy one-third of the wall-space. The floors should be of hard pine or oak (Georgia pine in this country), and perfectly tight. In regard to the walls there are differences of opinion, but it is probable that a plastering of mortar over laths, whitewashed with milk of lime, is the best, on account of its absorbing power, noxious gases being undoubtedly disposed of in this way by oxidation within the porous spaces. A plan of hospital was not unusual in the armies during the late war of the rebellion in America, in which the wards or pavilions were disposed in a radiating form around a circular court, from 100 to 150 ft. in diameter, according to the size of the hospital. A plan of Hicks hospital near Baltimore, Md., is sometimes given as a model. This has a mess dining-room in one of the radiating buildings, rather larger than the others, and the offices and other administration buildings in the court. A better plan was carried out in the hospital at Point Lookout, Md., in which the administration apartments, dispensary, mess-rooms, and surgeons' quarters were placed in a large building occupying a site among the other radiating buildings. The advantage is apparent in the open court that is unobstructed in regard to currents of air, and in the greater cheerfulness of the arrangement, which admits of a free view from one ward to all the others, allowing the convalescent patients who may be sitting in their respective porticoes to greet each other; for wounded and sick soldiers, when they are able to be so, are a very social fraternity. The central court can then be laid out in plats of grass and flower-beds, in the care of which the patients take great pleasure during their often long confinement and absence from family. The plan of the Lincoln hospital at Washington was the arrangement of the wards in the form of an isosceles triangle, they being placed *en echelon*, with the base of the triangle being left open. The triangular space between the wards was occupied by the various administration buildings.

HOSPITALS, NAVAL, establishments for the cure of sick and wounded seamen. They are served by naval medical officers. The naval hospitals at home which are at present kept up are at Haslar (q.v.) and Plymouth, Yarmouth, Haulbowline, Dartmouth, and Portland; but abroad there are such establishments at Malta, Bermuda, Halifax, Trincomalee, Jamaica, Esquimault, the Cape, Hong-Kong, Yokohama, and Lisbon. The annual cost of the naval hospitals amounts to about £65,000.

HOSPODAR, a Slavonic title once commonly given to the governors of Moldavia and Wallachia, whereas the prince of Romania is now known under the native Romanic title of *domnu*. Another Slavonic term, *wojewod*, was also often given to the hospodar, the term wojewod signifying the right and dignity of leading the army (being thus identical with duke), while hospodar (gospodar, gospod, gospodin, in the various Slavonic dialects) means simply master (dominus). Formerly the Lithuanian princes were likewise called *hospodars*, and the Polish kings, down to the time of Sobieski, assumed this title in their diplomatic negotiations with Russia. *Gosudar* (ruler, monarch) is even now the title of the emperor of Russia, and in conversation signifies master. See MOLDAVIA AND WALLACHIA.

HOST (Lat. *hostia*, a victim), the name given in the Roman Catholic church to the consecrated bread of the eucharist. It is so called in conformity with the doctrine of that church that the eucharist is a "sacrifice," in the strict sense of the word. The host in the Latin church is a thin circular disk of unleavened bread, made of the finest flour, and generally bearing some emblematic device, as the crucifixion, the lamb, or some words or initials of words having reference to the sacrifice. In the Greek and other oriental churches, as well as in the various Protestant communities, the eucharist is celebrated in leavened bread, only differing from ordinary bread in being of a finer quality; and one of the grounds of separation from the west alleged by Michael Cerularius was the western practice of using unleavened bread. The Greek and Protestant controversialists allege that, in the early church, ordinary or leavened bread was always used, and that our Lord himself, at the last supper, employed the same. Even the learned cardinal Bona and the Jesuit Sirmond are of the same opinion; but most Roman divines, with the great Mabillon at their head, contend for the antiquity of the use of the unleavened bread, and especially for its conformity with the institution of our Lord, inasmuch as at the paschal supper, at which "he took bread, and blessed, and brake it," none other than the unleavened was admissible (Exod. xii. 8, 15; Levit. xxiii. 5). See Klee's *Dogmatik*, iii. 190.

HOST, JENS KRAGH, a Danish historian, b. at St. Thomas, Sept. 15, 1772; d. Mar. 26, 1844. The great aim of his literary career was to create a conviction of their unity among the Scandinavian nations. With this view, he established, in company with Nyerup, Pram, and Baggesen, the Scandinavian literary society, which originated the journal entitled the *Scandinavian Museum*. His most important work is *Count Struensee and his Ministry*, (3 vols., Copenh. 1824), which was the first attempt to delineate, in a thoroughly impartial manner, the events of that singular period in Danish history. Among his other writings are: *Svenske Blade; Euphrosyne; Dannora; A Swedish Grammar and Dictionary for Danes; Lectures on the Swedish Language and Poetry; Life and Government of Gustavus Adolphus; Memorials of the Life and Government of Christian VII.;* and *History of the Danish Monarchy under Christian VII.*

HOSTAGE (through the French *ôtage* (ostage), from the Latin *obses*), one given in pledge for the performance of conditions. When a town capitulates, victors and vanquished usually give into the custody, one of the other, several officers, as pledges that each party will duly carry out the terms stipulated. When the terms are fulfilled, the hostages are exchanged; but if the terms be evaded, the opposite side holds the right to put to death or otherwise punish the hostages in its possession. It is needless, however, to add that, in modern civilized warfare, the circumstances would have to be very remarkable indeed to be held to justify so cruel a measure as the execution of a hostage.

HOSTILIUS, TULLUS, grandson of Hostus Hostilius, the champion of Rome in the first war with the Sabines, succeeded Numa Pompilius on the throne of Rome, 670 B.C. According to Livy and other writers, Hostilius made the famous arrangement, by the combat of the Horatii with the Curiatii, for the decision of the question of supremacy between Rome and Alba, which was decided in favor of the former; he fought against Fidenæ and Veii, and conquered these cities, destroyed Alba, and removed the inhabitants to Rome, giving them Mt. Cælius to dwell on, and carried on war against the Sabines. As he grew old, he became more pacific in his inclinations, and determined to attend more diligently to the worship of the gods, but he had too long provoked them by his negligence to be forgiven, so that, when he wished to inquire of Jupiter Elicius, the god consumed Hostilius and his house with fire, about 638 B.C. According to Niebuhr, Arnold, etc., there are glimpses of a distinct personality in the legend of Hostilius, unlike those of Romulus and Numa, which are merely personifications of the two principal stages of a nation's growth.

HOT-AIR ENGINE. See CALORIC ENGINE, *ante*.

HOTBED, a heap of fermenting matter, covered with a layer of earth, and generally surmounted with a frame, for the cultivation of plants which require more than the natural heat of the climate and season, but not so much as to render the hothouse necessary. The heat is the result of fermentation. Hotbeds, not being expensive, are in very general use; as for growing melons and, in the northern parts of Britain, cucumbers, for raising ornamental plants from seed in spring, to be planted in the open ground as summer advances, etc. The material mostly used is stable-dung, or a mixture of horse-dung and litter; but tanners' bark, leaves, the waste of flax, cotton, or woolen factories, etc., are sometimes substituted for it. The heat of a very rapid fermentation being too great, it is necessary that this be over before the hotbed is planted; and it is usual, on this account, to prepare the materials for some time before it is formed. A hotbed is made highest at the back, sloping—in the northern parts of the world—towards the south. The bed extends on all sides 6 in. or thereby beyond the frame, which has a movable glass sash or sashes, according to its size. The thickness of the hotbed, and of the earth upon it, are accommodated to the purpose intended and the degree of heat required. When the heat decreases, it is for some purposes necessary to keep it up by *linings* of the same material as the hotbed added to the sides of it.

The sashes of hotbeds must be partially removed during the day, to permit ventilation and the escape of vapor.

HOTCHPOT, a phrase used in English law to denote that where one child has already received an advancement out of the father's personal estate, that child must bring such sum into hotchpot before he will be allowed to share with the other children, under the statute of distributions, after the father's death. In other words, a child who has got money from the father to place him in business, etc., must treat that as a payment to account of his share at the father's death. A similar but not identical doctrine exists in Scotland under the name of collation (q.v.).

HOTCHPOTCH, a Scottish dish, may be defined as a kind of mutton-broth in which green peas take the place of barley or rice. This is a dish only to be obtained in perfection in summer, when green peas are in season. Put on two quarts of water, and when it boils put in 3 lbs. of the back-ribs of mutton or lamb, paring off the fat if there be too much. Put in with the meat two or three carrots cut into squares, and two grated, also three or four sweet young turnips in squares, a cauliflower and a lettuce cut down, a few young onions shred, a little parsley, and about a pint of sweet young peas. Boil this for an hour and a half, then take out the meat and cut it in chops, laying it aside. Add another pint of young peas, seasoning with pepper and salt; and when these peas are done, put in the chops. In a few minutes afterwards, serve up the whole in a tureen. Instead of cutting the meat into chops, it is not unusual to keep it whole and serve it separately. Neck of mutton makes excellent hotchpotch. The composition of the mess may be varied by the addition of beans, white cabbage sliced, or asparagus-points. Some boil the empty hulls of the peas in a little water apart, and add the strained liquor to the rest, which gives additional sweetness. Hotchpotch is considered the *chef-d'œuvre* of Scottish cookery.

HÔTEL, originally *hostel*, or *hostelrie*, a French term applied to an inn, or house for the temporary accommodation of travelers. The term, however, is also applied in France to the town mansion of a distinguished personage, and in like manner the word inn was at one time indifferently used in England to signify the town residence of a great man. The name hostelrie was applied by Chaucer to a public inn, and till a more recent period it was similarly used in Scotland. From its general use comes the designation hostler, which originally signified the keeper of the inn or hostel. Only in recent times has the significant old English word inn been eclipsed by the reintroduction of hostel, under the softened form of hôtel.

An account of inns ancient and modern, under whatever designation, would form an interesting chapter in social history. The caravansary (q.v.) of the east is the most ancient species of inn of which there is any notice. The Greeks and Romans did not improve on the quality of these oriental establishments. Their inns, if worthy of the name, were little better than receptacles for humble classes of wayfarers, or places where cooked food and wine were dispensed to the hungry and thirsty stranger. Along their highways the Romans gave encouragement to these primitive inns; the best of such establishments being called *cauponæ*, or *tabernæ diversoriæ*, while those of an inferior kind were known as *popinæ*, of which some specimens have been disclosed at Pompeii.

The duties of hospitality and also the obligations of religion long postponed the introduction of regular inns. In mediæval times the castles of the barons offered shelter with straw, and sometimes food, to the wayfarer of high and low degree, and there are traditions to the effect that to pass some of these strongholds without calling to render obeisance, and receive the hospitality of the owner, was deemed an insult. But the monastic establishments, great and small, scattered over every part of Christendom, formed the chief *hospitia* (see HOSPICE). With the general improvement of society and the increasing concourse of travelers came the modern inn, or professional hospitium, at which entertainment for man and horse was afforded as a matter of business. Nowhere in Europe did this class of establishments so soon attain to a determinate and respectable character as in England. Growing first into importance in London, York, Oxford, Bristol, and some other cities, the substantial and well-managed English inn was imitated on a smaller scale in the different provincial towns, and gained a good standing in national usage before it spread to Scotland; the inns of which, even up to the middle of the 18th c., were on a meager scale of accommodation. It is not necessary to call to mind more than a few of the interesting old inns in London, all celebrated less or more from their respective signs: the *Angel* at St. Clement Danes, and *Angel* at Islington; the *Bell*, Warwick Lane, Newgate Street; *Belle Savage*, Ludgate Hill; *Bull and Mouth*, St. Martin's-le-Grand; *Four Swans*, Bishopsgate Street; *Saracen's Head*, Snow Hill; *Golden Cross*, Charing Cross; *White Horse*, Fetter Lane; and *Tabard*, Southwark. All of these have either disappeared or have been changed in character. For the most part, the old inns of London, Westminster, and Southwark consisted of a building round a courtyard, entered from the street by a wide covered passage. The ground-floor was disposed as stables, kitchens, and other offices, with a large reception-room; above, were the lesser apartments and bedrooms, these last all opening on hanging wooden galleries, whence the inmates could look down on the busy scene of arrivals and departures in the courtyard beneath. Some specimens of

these old inns with open galleries still survive. Such was the *Tabard*, renowned as the hostelry from which Chaucer's pilgrims set out for Canterbury. There is reason to believe that this form of construction was derived from the arrangement of ancient Roman villas, which consisted of buildings round a series of courtyards; hence, also, the form of French hotels, public and private. Modern Italy has examples of inns of this form. We may allude particularly to the *Hôtel de Ville* at Milan, and the *Albergo delle Due Torri* at Verona; this last having hanging galleries round a courtyard in precisely the old English style.

Of the character and management of the inns of England, with their offers of "entertainment to man and horse," we are favored with innumerable glimpses in the fictions of Fielding, Smollett, Goldsmith, and others—the jolly hostess, the obsequious waiters, the bouncing chambermaids, the hostler who takes the traveler's nag, and above all the garrulous host, who, when invited, gives his company to his guests, tells them the news, and at dinner, according to use and wont, places the first dish on the table. See *Dr. Syntax's Tour in Search of the Picturesque*, illustrated by Rowlandson, for some humorous delineations of inn-usages. The great personal comfort and independence of feeling enjoyed in English inns is frequently referred to in literature. Archbishop Leighton, who died in 1684, in the *Bell*, Warwick Lane, "often used to say, that if he were to choose a place to die in, it should be an inn; it looking like a pilgrim's home, to whom this world was all as an inn, and who was weary of the noise and confusion of it. And he obtained what he desired."—Burnet's *Own Times*. Dr. Samuel Johnson, as is well known, expatiates on the delights of an English inn; on one occasion, as related by Boswell, repeating with great emotion Shenstone's lines:

> Whoe'er has traveled life's dull round,
> Where'er his stages may have been,
> May sigh to think he still has found
> The warmest welcome at an inn.

English inns have not lost their reputation for comfort and the attention paid to guests; but the almost entire alteration in the methods of traveling by the introduction of railways has left them considerably behind the requirements of the age. Except in the smaller towns and villages, they have been superseded by hotels—that is, houses of a more pretentious kind. The better classes of these hotels contain private parlors for families or individuals who choose to be alone, also a large apartment for travelers generally. Houses frequented by commercial travelers have a room set apart for this class of customers. The plan of taking meals at a *table-d'hôte* has not hitherto made much progress in England, as if it were somehow contrary to the national reserve and exclusiveness. The marked defect in the modern hotels in London and elsewhere in England consists in their insufficient size. The greater number are merely private houses transformed for the purpose, and are inadequate to meet the swollen dimensions of railway traffic. The truth is, the establishment of inns or hotels in any part of Great Britain has not hitherto been looked to as a profitable investment for a large capital. The business of innkeeping has been thought a little derogatory, and few except old waiters, who had realized some money by their services, embarked in the business. On the continent of Europe, the trade of hotel-keeping enjoys a considerably higher social status. A large capital is invested, the keeper or manager is a man of local note, and the waiters or *garçons* are young men who follow the business as a profession in which they expect to rise by their diligence and acquirements. In point of fact, the *garçon* is much above the English waiter in his aims. He voluntarily undergoes a kind of curriculum of education, by passing from the hotels of one country to those of another, and does not consider himself proficient till he speaks German, French, Italian, and English; at the very least, if of German birth, speaking French with fluency. Some good and capacious hotels, built distinctly as such, have lately been established at the principal railway termini in London, also at Dover and a few other places. With these exceptions, most English hotels are far behind the high-class hotels of the continent; such as the *Grand Hôtel* and the *Hôtel de Louvre* at Paris, the *Métropole* at Geneva, and some of the fine establishments at Hamburg. London is now gradually becoming better supplied. The *Euston*, the *Victoria*, the *Grosvenor*, the *Paddington*, the *Charing Cross*, the *Midland* (all connected with railway termini); the *Alexandra*, the *Palace*, the *Inns of Court*, and the *Langham* are exceedingly well-appointed hotels.

In England the hotel system of living is simply that of paying for what is called for, with the addition of a certain charge per diem for the rooms which are occupied; in France and other continental countries, this plan is so far modified by the plan of dining at a table d'hôte, which lessens the general expenses. Both in English and continental hotels, the charge for attendance is now made explicitly in the bill, a very grateful improvement. The ordinary hotels in all parts of the United Kingdom are licensed by magistrates to sell wines, spirits, and other excisable liquors, and therefore come under the category of public-houses open to the supervision of the police. In the higher-class hotels, however, the supply of liquors is confined to the resident guests; and it is only in the others that drink is sold as in taverns. See TAVERN. Latterly, there has sprung up a class of houses, some of them on a considerable scale, known as *temperance hotels*, which have no license, and do not supply any excisable liquors. See TEMPERANCE MOVEMENT.

Throughout the United States of America, the system of hotels has taken a peculiar turn. The hotels are built for the purpose, and usually very large; with few exceptions they are conducted as boarding-houses on the plan of charging so much per diem, everything included excepting liquor, which is obtainable in a large drinking-room called the bar. A common charge is about 10s. 6d. sterling a day. All the meals are given with liberal profusion in the table-d'hôte fashion; and as absence from these entertainments—to dine with a friend, for example—makes no difference of charge, the system, though simple and adapted to a constant flow of customers, is not without its disadvantages. Elegant in their architecture, and spacious and commodious in their interior arrangements, the American hotels are got up at great expense, as may be judged from their extensive accommodation, which ranges from 180 to 800 rooms. The *Astor House*, the *St. Nicholas*, and the *Metropolitan*, at New York, are among the largest and most splendid of these establishments. The system of American hotels is generally followed in the British colonies.

HOTELS, LAWS RESPECTING. See INN and INNKEEPER, *ante*.

HOTHO, HEINRICH GUSTAVE, 1802–73; b. Germany; a writer, and one of Hegel's most distinguished pupils, who became professor of the university of Berlin. He was extremely able as an art-critic, and was for many years director of the art collection in the royal Berlin museum. He published *Vorlesungen über Aesthetik; Geschichte der deutschen & nieder landischen Malerei, die Malerschule Hubert's van Eyck;* and several other able works on art.

HOTHOUSE, a building intended for the cultivation of exotic plants requiring a higher temperature than that of the open air. The term is sometimes employed to include even the greenhouse and conservatory, but more generally it is applied to those buildings in which artificial heat is kept up at all seasons of the year, as the bark-stove (q.v.), dry-stove (q.v.), forcing-houses, pinery, peach-house, etc. Hothouses resemble greenhouses in their general form and structure, and with most of the same varieties in both. It is important that they have a good exposure, so that the plants may enjoy as much sunshine as possible; and the free admission of air to the utmost extent allowed by the requirements of climate, is very advantageous. The oldest mode of heating hothouses is by furnaces and flues; the other modes practiced are by steam, or by hot water led through the house in tubes, and by hot air admitted into the atmosphere of the house. Into the details of these modes we cannot enter.

HOT SPRINGS, a co. in s.w. central Arkansas, intersected by the Ouachita river, and the Cairo and Fulton railroad; 900 sq.m.; pop., '70, 5,877—650 colored. The surface is hilly and is to a large extent covered with forests. The chief productions are corn, cotton, and pork. Co. seat, Rockport.

HOT SPRINGS, a small t. in Arkansas, U. S., 45 m. w. by s. of Little Rock, and celebrated as a resort for invalids to the hot springs which give the name to the village and the county. Fifty-seven springs, from 93° to 150° F., break out from the w. side of a mountain, and flow into a creek which empties into the Wachita river, 6 m. distant. There are also cold chalybeate springs, much frequented, and sulphur springs in the same county. Pop. '70, 1276.

HOTTENTOT COUNTRY, a region of s. Africa, stretches indefinitely to the n. from the Cape colony, having the Atlantic on the w. and the Bechuanas and Kaffers on the e. In e. long. it extends between 15° and 27°, and in s. lat. between 31° and some line to the n. of the tropic of Capricorn. This territory is but of little value. Its principal river, the Orange, is almost useless for navigation; and though here and there well wooded, yet the surface is chiefly an arid desert. The only examples of civilization are to be found in several missionary establishments.

HOTTENTOTS is the name generally given by Europeans to a singular race of people, supposed to be descended from the aborigines of southern Africa, and now dwelling for the most part in and about the English settlement of the cape of Good Hope. The origin of the name Hottentot is uncertain. Some think it is of Dutch origin; a word coined by the early Dutch settlers to convey by the sounds hot *en* tot, hot *and* tot, some idea of the peculiar clicking noise made by the people when speaking. Dampier, however, wrote the name *Hodmadods*, instead of Hottentot; and Prichard says that it is probably a corruption of *Houteniqua*, the name of a particular tribe now extinct, or at least unknown. They now call themselves by various names, supposed to be those of tribes, as Attaquas, Hessaquas, Dammaras, Saabs or Saaps, Namaquas, and Koranas; and by the collective name of Quai-quæ, or Gkhuigkhui.

In the ethnological classification given by Dr. Latham, the Hottentots are ranged under the second great division of the human family—Atlantidæ. In the older classification, that of Blumenbach, they are ranged under the third great division of the human race—the *Ethiopians*—under which division that author also places the negroes. But the Hottentots are not like the negroes, and are more akin to the Mongolians; having broad foreheads, high cheek-bones, oblique eyes, and a dirty, olive-colored complexion. The width of the orbits, their distance from each other, the large size of the occipital foramen, are points in which the Hottentots resemble the northern Asiatics, and even the Esquimaux. The person of the Hottentot, when young, is remarkable for

its symmetry. The joints and extremities are small, and the males look almost as effeminate as the women. The face, however, is in general extremely ugly, and with age this ugliness increases. Sir John Barrow, in describing the Hottentot women, observes of them that before child-bearing they are models of proportion, every joint and limb rounded and well turned, their hands and feet small and delicate, and their gait by no means deficient in grace. "Their charms, however, are very fleeting. At an early period of life, and immediately after the first child, their breasts begin to grow loose and flaccid, and as old age approaches become distended to an enormous size; the belly protrudes; and the hinder parts swelling out to incredible dimensions, give to the spine a degree of curvature inwards that makes it appear as if the *os coccygis*, or bone at the lower extremity of the spine, was elongated and bent outwards, which is not the case." The appearance of the Bosjesmen, or Bushmen, who are the most degraded tribe of the Hottentots, is still more revolting.

The language of the Hottentots is quite as singular as their personal appearance. It has been called "the click language," and has also been compared to the clucking of a hen when she has laid an egg. The dress of the Hottentot in his native state is exceedingly simple, being merely a strip of the skin of some animal tied round the waist, from which there depends a sort of apron that hangs down both before and behind. This is nearly the same for both sexes, so that in the summer both go almost naked, protecting their persons from the sun by a covering of grease; but in the winter they have a sort of cloak made with skins, that covers nearly the whole body. The Hottentots live in kraals, or villages, consisting of a number of circular huts like beehives. They have both oxen and sheep, in the managemeut of which they show great skill. They are also addicted to the chase, in which they use poisoned arrows, javelins, and spears. Their only manufacture is a rude kind of earthenware; except, of course, that they make their own sheepskin clothes, such as they are, also their bows and arrows, and other weapons. Like most savages, they have some taste for music, which they practice upon a rude sort of guitar with three strings, and a flute made of the bark of trees. Of religion there appears to be but very little notion among the Hottentots, and they have no particular observances at either births, marriages, or funerals. Dr. Prichard, however, observes of them: "Although the wild tribes of the Hottentot race display ferocity and all the other vices of savage life, yet we have abundant proof that these people are not insusceptible of the blessings of civilization and Christianity. No uncultivated people appear to have received the instructions of the Moravian missionaries more readily than the Hottentots, or to have been more fully reclaimed and Christianized."

The Hottentots, as a distinct race, first became known to Europeans about the year 1509, when Francisco d'Almeyda, viceroy of India, landing at Table bay, was killed, with about seventy of his followers, in a scuffle with the natives. They were afterwards frequently visited by navigators from different countries; but no authentic accounts reached Europe respecting them until the Dutch settled in the cape of Good Hope in the middle of the 17th century. The Hottentots were then much more numerous than at present, but upon becoming addicted to rum and brandy their numbers diminished gradually. Many of the tribes parted with their flocks and herds to procure the fire-water, and eventually they became the absolute slaves of the Dutch settlers, or Boers. From this condition they have been delivered by the enlightened and humane policy of the British government; and as free laborers they make excellent herdsmen and drovers. Their number at present is thought to amount from about fifteen to twenty thousand, not including those who in all probability may be found dwelling more in the interior. Of the Bushmen no numerical estimate has been formed. They are widely scattered throughout the English settlements, but their numbers must be very small, while their wretched and degraded habits are such that it is thought they will soon become utterly extinct.

HOTTENTOT'S BREAD, *Testudinaria elephantipes*, a species of yam, indigenous to s. Africa. Slender, vine-like stems grow to a height of 30 or 40 ft., with many branches bearing bright, heart-shaped leaves. The root-stock stands conspicuously above ground, hemispherical or nearly globular in shape, and sometimes 3 ft. in diameter, covered with a brown, cork-like substance with many-sided protuberances separated by deep cracks and fissures. From fancied resemblances of this characteristic root-stock, the plant is sometimes called elephant's-foot, according to its systematic name, and sometimes tortoise-plant. The fleshy interior affords food to baboons and other animals, but it is said that the natives do not eat it. The dormant root-stocks are imported apparently dead, but when placed on the ground soon throw out rootlets, while stems grow rapidly from the upper surface. It is cultivated as a greenhouse curiosity, and its branching stem and pleasing foliage make it a favorite greenhouse climber.

HOTTINGER, Johann Heinrich, 1620–67; a Swiss orientalist and biblical scholar. He first settled at Groningen, and afterwards at Leyden, where he became assistant to Golius, the best orientalist of that age. He also took lessons in Arabic and Turkish from Ahmed Jon Ali, a Mohammedan from Morocco, of whom he often speaks in his works. Golius had hoped to take his pupil with him to the east, but the senate of

Zurich interfered, and Hottinger, after visiting France and England, returned home. In 1653 the chairs of rhetoric, logic, and scriptural theology were offered to him, and he had only filled them for two years, when, at the urgent request of the elector of Palatine, he was permitted to remove to Heidelberg for three years. He there taught the eastern tongues and biblical criticism with such success and distinction as to revive and spread the fame of the university. Prolonging his stay in the Palatinate till 1661, he returned to Zurich in that year, and was made rector of the university. His reputation still continued to increase, and in 1667 he received such flattering offers from Leyden that he resolved to accept them. Before setting out for this new sphere of labor the boat on which he was crossing the Limath, with his wife and family, was upset, and Hottinger, who might have saved his own life, was drowned in attempting to save that of his wife.

HOTTO'NIA, a genus of plants of the natural order *primulaceæ*, of which one species, *hottonia palustris*, water violet or featherfoil, is among the most beautiful of British aquatic plants. It is not found in Scotland. Its leaves are all submerged, crowded, and much divided; the large beautiful, pale purple, whorled flowers alone rise above water on a long cylindrical stalk. Other species of hottonia are found in the east.

HOT WALLS, or FLUED WALLS, in gardening, are walls furnished with furnaces and flues, in order to the production of finer kinds of fruit than could otherwise be expected in the climate. The flues are led as obliquely, and make as many turns from right to left as are consistent with their drawing well, so that as little heat as possible may escape by the chimney, and as much as possible may be expended on the wall. The heat is applied chiefly during spring. At that season, also, movable glazed frames, or sometimes mere screens, are placed in front of the walls.

HOUA'RIOS are small coasting-vessels and pleasure-boats used in parts of the Mediterranean. They bear lateen sails, and have each two masts and a bowsprit.

HOUDIN, ROBERT, 1805–71; b. Paris, and was educated for a lawyer, but at his own request followed his father's trade of a watchmaker. He constructed mechanical toys for the exhibition of Paris in 1844, which were awarded medals. He had an enthusiasm for all feats of conjuring, and originated his *Soirees fantastiques*, or magical performances, for which he afterwards became famous in Europe and America. He visited Algeria at the instance of the French government, with a view of ascertaining how the priests there performed the wonders with which they incited the people to rebellion, and succeeded in surpassing all their marvels, and counteracting their seditious influence. He published his autobiography and his *Confidences*, which were translated into English.

HOUDON, JEAN ANTOINE, 1741–1828; b. Paris; one of the most famous modern French sculptors, excelling in busts or portraits. Among his subjects were Voltaire, Cicero, Napoleon, Josephine, Ney, Rousseau, Diderot, Mirabeau, Franklin, Turgot, and George Washington. His statue of the latter is in the capitol at Richmond, Va. He visited the United States in 1785 with Franklin, and was for some time Washington's guest.

HOUGHTON, a co. in the n.w. part of the peninsula of Michigan, lying along lake Superior and embracing Portage lake, which is connected with lake Superior by a canal; 2,000 sq.m.; pop. '80, 22,473. The surface is hilly; agriculture is much neglected, the main business of the people being copper-mining. The mines of the region are the richest in the world. Co. seat, Houghton.

HOUGHTON, the capital of the co. of the same name in Michigan, on Portage lake, 10 m. from lake Superior, to which there is a ship canal; pop. 1540. There are some manufactories, but the copper trade is the chief business, this being the center of the richest mining district in the country.

HOUGHTON, RICHARD MONCKTON MILNES, Lord, b. England, 1809; graduated at Cambridge, and was elected to parliament in 1837 as a supporter of Peel. He afterwards joined Russell's party, but declined office under Palmerston. His attention was mainly directed to foreign affairs and the reform of penal institutes. He brought in the first bill for the establishment of juvenile reformatories in 1846, and is the president of the great reformatory establishment at Red Hill. In 1873 he presided over the Norwich meeting of the social science congress. He has written several volumes of poems, under the title of *Poems of Many Years; Palm Leaves*, etc., and many pamphlets—notably, *One Tract More*, in the Oxford controversy of the *Tracts for the Times;* and the *Real Union of England and Ireland*, advocating concurrent endowment of the Protestant and Catholic churches. His last work is *Monographs, Personal and Social.*

HOUGHTON, WILLIAM, b. England, 1807; graduate of a London college. In 1833 he became minister of a Congregational church, and in 1855 was chosen president of the Congregational union of England and Wales. He has been a great traveler and is the author of *The Ecclesiastical History of England*, and *Country Walks of a Naturalist with his Children.*

HOUGH'TON-LE-SPRING, a t. of the co. of Durham, England, nearly 7 m. n.e. from Durham, on the Great Northern railway. The town of Houghton-le-Spring has recently

much increased, and owes its prosperity mainly to the numerous coal-mines of the neighborhood, the coal produced by which is of the most excellent quality. Pop. '71, 5,276. The surrounding district is very populous, and contains numerous villages.

HOULTON, the seat of justice of Aroostook co., Me., situated at the terminus of the New Brunswick and Canada railroad, the most northerly settlement of any consequence in the wild n.e. region of the state; pop. of township, 2,850. In the village are the Houlton academy, half a dozen churches, and a number of manufactories. It is about 100 m. n.e. of Bangor.

HOU-NAN', or the HU-NAN, one of the provinces of s. central China; 74,325 sq.m.; pop. 18,652,507. The surface is rough, and the region is little known to Europeans. The chief town is Chang-Sha.

HOUND (Ger. *hund*), a name commonly given to those kinds of dog which are used in hunting, but more especially, at least by systematic writers on dogs, to those which hunt by scent rather than by sight. When this definition is adopted, greyhounds are not regarded as true hounds. Examples of true hounds are found in the bloodhound, the old English southern hound, the staghound, the foxhound, the harrier, and the beagle; closely allied to which are also the pointer, setter, spaniel, etc. See these heads. The hounds are by some naturalists regarded as a distinct species of dog (*canis sagax*). They are characterized not only by fineness of scent, but by great docility and sagacity. The muzzle is not so sharp as in greyhounds, nor is the form so slender. The ears are large and pendulous. Some varieties have rough, and some have smooth hair. The rough-haired varieties are generally those which exhibit the most perfect domestication, and in which the attachment to man is closest. True hounds are figured in ancient Egyptian paintings and sculptures. It is believed that all the best varieties were introduced into Europe in comparatively recent times from the east.

HOUND FISH, a name given to certain kinds of sharks, as the *mustelus lævis*, or smooth hound fish of European waters, and its American representative, the *mustelus canis* of DeKay, the dog shark, a rather larger fish than the former, being from 2 to 4 ft. in length. They are sometimes spoken of as a larger kind of dog fish; but the dog fish belongs to the genus *acanthias*. See DOG FISH and SHARK, *ante*.

HOUNDS, in point of law, render the person who keeps them liable to the dog-tax—viz., five shillings each—unless compounded for; but a person who follows the hounds, i.e., goes out hunting with them, does not require a game license. Though such a person, however, is not punishable summarily by a magistrate for an illegal trespass when following the hounds on a stranger's lands, yet he is liable to an action at law for the trespass, except only in the case of fox-hunting, which to this extent may be called a privileged pursuit, at least in England. In Scotland, fox-hunting is not allowed as an excuse for a trespass; and in England and Ireland, even in following the fox-hounds, no more damage is to be done than what is absolutely necessary.

HOUND'S-TONGUE, *Cynoglossum*, a genus of plants of the natural order *boragineæ*, of which there are many species, all of a coarse appearance, with small flowers. The COMMON HOUND'S-TONGUE (*C. officinale*) is a native of Europe, Asia, Africa, and North America; not uncommon in some parts of Britain, especially near the sea-coast. It has soft downy leaves, of a dull-green color, purplish-red flowers, and a stem about 2 ft. high. Its odor is very disagreeable. The root was formerly administered in scrofula, dysentery, etc., and is said to be anodyne. It is also one of the pretended specifics for serpent-bites and hydrophobia.

HOUNSLOW, a small t. of England, in the county of Middlesex, consists of a single street, stretching along the Great Western road from London, from which it is distant 10 m. west. Its church, a modern building in the Italian style, is surmounted by 12 small spires and a belfry. The numerous inns and posting-houses of Hounslow were busy and prosperous till the opening of the railways to Southampton and Bath. Previous to that event, its posting business was as extensive as that of almost any town in England. About 800 horses were then maintained here, and about 183 coaches, while 500 coaches passed through the village daily. The heath, formerly notorious as the scene of highway robberies, is now in great part inclosed. Numerous villas have risen up around the town. On the heath are extensive gunpowder mills, cavalry barracks, and an arsenal. Pop. '71, 9,294.

HOUR, a measure of time equal to $\frac{1}{24}$th part of a day. The division of the day into hours seems to have been known to the Babylonians and Egyptians, from whom, first the Greeks, and then the Romans derived it. But their scheme of division extended only to the natural day (while the sun was above the horizon), which they divided into 12 parts. The consequence of this was that the hour constantly varied in length. This system was introduced into Rome by L. Papirius Cursor about 293 B.C., and during the Punic wars, the Romans adopted the division of the night also into 12 parts. This system continued till about the end of the 4th c., when the present system was adopted. In the British empire, and most continental countries, the day is reckoned from midnight to mid-day 12 hours, and mid-day to midnight 12 hours. In Italy the day is reckoned from sunset to sunset, and the hours are counted from 1 to 24. The Chinese reckon from an hour (in our time) before midnight till the corresponding time next

night, 12 hours, each hour being equal to two of ours. The Japanese still follow the old custom of reckoning from sunrise till sunset. Astronomers reckon from mid-day (on the previous day) to mid-day, counting from 1 to 24.

HOÚRA, a t. on the right or w. bank of the Hoogly, stands within the limits of the 24 pergunnahs, in lat. 22° 36′ n., and long. 88° 23′ east. It is directly opposite to Calcutta, of which it may, in fact, be regarded as a suburb. The river between them is their common harbor; and Houra, being inhabited chiefly by ship-builders, bears pretty nearly the same relation to the aggregate metropolis of India as Blackwall bears to London in its largest sense. It is hence that the great railway takes its departure for the n.w. provinces.

HOUR-GLASS, an instrument for measuring intervals of time. It is made of glass, and consists of two bulbs united by a narrow neck; one of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as much as can run through the orifice in an hour, if the instrument is to be an hour-glass; in a minute, if a minute-glass, etc. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of the time. The hour-glass was almost universally employed in churches during the 16th c., and continued in use till about 50 years ago. In several of the churches in England hour-glass stands of elegant workmanship are still to be seen.

HOURIS, beings of the Mohammedan paradise; virgins not of human flesh and blood, but formed of musk, and, by a special dispensation, eternally virgins. The name means literally "the black-eyed." In the fanciful story of the Koran these fair creatures dwell in pavilions of pearl, and repose on gorgeous couches. The pious Mohammedan, of however low an origin, is assured of at least 72 of these divine beings in paradise in addition to the wives who belonged to him while he lived on earth. The houris have the power to conceive and bear children at will, who within an hour grow to maturity.

HOURS, in mythology. See HORÆ.

HOUSATONIC, a river of New England, which rises in Massachusetts, and flows southwardly through Connecticut into Long Island sound. Its length is about 150 m., through a picturesque country, and its numerous falls afford water-power to many manufacturing villages. For 40 m. its course is followed by the Housatonic railway.

HOUSE, in point of law, is an Englishman's castle, though not a Scotchman's. In other words, when a man shuts himself up in his own house, no bailiff can break open the door to arrest him, or seize his goods for debt in England or Ireland, and no court can give a bailiff such power; in Scotland, however, even a man's own house is no protection, for leave can be got from the court, often called on that account the queen's keys, which enables the messenger to break open the outer door and arrest. In England, therefore, if a person can manage to procure supplies from without, he can fortify himself against the enemy for any length of time; but though it is not competent for the bailiff to break open the outer door by force, yet every trick or stratagem is fair in order to effect a peaceable entry, and once in he cannot be turned out. Where the party is charged with a criminal offense, a constable armed with a warrant, or in some cases without, is entitled to break into the house and arrest him, both in England and Scotland. A man is entitled also to defend his house against trespassers and thieves, using no greater force than is necessary; and, if necessary in that sense, he may even kill the intruder, though very strong circumstances are required to justify this. He may also put spring-guns on the premises. In Scotland a peculiar name is given to the offense of feloniously assaulting a man in his own house, called haimsucken (q.v.), a name also used in the old law of England; and all offenses committed in a house are generally punished more severely. *Housebreaking* is a technical name in Scotland, but in England is a popular phrase, the legal terms being larceny or robbery in a dwelling-house, or burglary, according to the circumstances.

HOUSEBOTE, in English law, the right which a tenant has to cut wood on the land to repair the house, often called *estovers.*

HOUSEBREAKING. See HOUSE.

HOUSEBURNING, a crime in Scotland, generally called arson in England.

HOUSE OF COMMONS. See PARLIAMENT.

HOUSE OF CORRECTION, a jail which is not under the ordinary charge of the sheriff, but is governed by a keeper; it is also sometimes called a bridewell. These houses were originally intended for the detention of vagrants and convicted persons, and compelling these to work; but their purpose is now extended in England, and the distinction between jail and house of correction abolished. The persons who may be committed to them are prisoners convicted of felony or misdemeanor, persons committed on charge or suspicion of felony or of misdemeanor, and vagrants. And any justice may commit to the house of correction persons awaiting their trial and persons convicted of small offenses. The prisoners are classified, and the regulations are mainly defined by the prison act of 28 and 29 Vict. c. 126. In Scotland the regulation of prisons is trans-

ferred to a board of directors of prisons, 23 and 24 Vict. c. 105, 28 and 29 Vict. c. 84, 34 and 35 Vict. c. 112.

HOUSE-DOVES, in the law of England, are protected like domesticated animals, and the taking of them is in general larceny; and if the offense of larceny cannot be made out, then a magistrate may inflict a penalty of £2 over and above the value of the bird (24 and 25 Vict. c. 96, s. 23). In Scotland it is also a theft to break into dove-cotes. But there is no summary redress for the lesser offenses.

HOUSE-FLY, *Musca domestica*, an insect too well known to need description, and remarkable for its extensive distribution both in the old and in the new world. It belongs to the vast dipterous family *muscides*. The maggots live in moist dung, in heaps of rotting vegetables, etc. When house-flies become annoying, various expedients are resorted to for killing them, as trapping in glasses partially filled with some sweet viscid fluid, or by pieces of paper covered with a mixture of sweet and poisonous substances. Sweet substances, however, attract flies into a room, so that the benefit of fly-traps is often doubtful; and care must be taken that the poisons used do not endanger the lives of children or others. Quassia is safe enough in this respect, and very fatal to flies.

In addition to what has been said in the article DIPTERA concerning the power which many insects possess of walking on perpendicular walls, ceilings, etc., it may here be mentioned that, according to the observations of Mr. Hepworth, who has carefully investigated this subject, although the membranous disks (*pulvilli*) on the foot of a fly are incapable of being used as suckers, yet the hairs with which they are thickly beset are terminated by minute disks, which probably are so used. At the same time, these minute disks appear to exude a liquid, not viscid, which probably serves to make the adhesion more perfect.

The proboscis of the house-fly is a very interesting microscopic object. It is chiefly formed by an extraordinary development of *tonguelet* or *ligula*, the upper part of the under-lip (*labium*), but with this are combined lancets formed of the metamorphosed *maxillæ*. (For these, see COLEOPTERA.) The lobes of the ligula are much enlarged and fleshy. They are surrounded by rough hairs, to aid in scraping or tearing delicate surfaces. There are many rows of these hairs on each lobe. In using its proboscis to feed on dry substances, as sugar, the fly moistens them with a liquid which may be regarded as saliva, so as to fit them for suctorial action. To aid in this suctorial action, the muscles of the lobes of the ligula are disposed in a spiral form.

HOUSEHOLD, ROYAL (of Great Britain), the personal attendants upon the reigning sovereign. The establishment was first regulated during the reign of Edward IV. (1461–83), who defined the offices and duties of its members. In the *Household Book* compiled by his orders regulations were made for the table of the king, the daily allowance of provisions, the amount of fuel and lights due to peers of each rank in attendance at court, and all officers and servants on ordinary and festive occasions; gifts, arms, wages, and liveries were also regulated from the highest to the lowest. Subsequent rulers improved upon these regulations. Henry VIII. found it necessary to exclude vagabonds, rascals, and boys from his household. But no definite rules were laid down until 1780, when Burke introduced a plan for radical reform. The expenses were almost beyond belief. Richard II. was always attended by a guard of 200 men, and had also in his retinue 13 bishops, besides barons, knights, and esquires. The household of Edward IV. cost £13,000 a year; that of William and Mary, £15,000. Since the accession of William III., parliament has fixed the amount of appropriation at the beginning of each reign. To the present queen the allowance is £385,000, distributed as follows: privy purse, £60,000; household salaries and retired allowances, £131,260; household expenses, £172,500; royal bounty, alms, and special services, £13,200: leaving an unappropriated balance of £8,040 to be used at discretion. But these sums throw little light upon the comparative grants for the sovereign's household and personal expenses. The lord-steward is the chief officer of the household, and under him are the treasurer, controller, paymaster, almoner, and a number of clerks. The steward has a salary of £2,000 a year. His authority extends over the offices of treasurer, controller, and master of the household, the first two of whom act as his deputies, and all the household officers and servants are subject to his authority except those of the chapel, the chamber, and the stable. The lord-chamberlain is the head of the second division of household officers. A third branch of the household is under the direction of the master of the horse, and embraces the master of the hounds, the grand falconer, the crown equerry, other equerries, and pages of honor. The ladies of the household fill a more important rank in the court of a female sovereign. The mistress of the robes is the head of this department, and under her are the ladies of the bedchamber, the maids of honor, and a great number in subordinate places. The office of mistress of the robes is of ancient and high dignity. She has the superintendence of all duties belonging to the bedchamber, within which the lord-chamberlain has no authority, regulates the rotation and the times of attendance of all the ladies, has the custody of the robes, and on state occasions it is her duty to see that the ceremony of robing the queen is properly performed. She rides in the same carriage with the queen on state occasions. The ladies of the

bedchamber are the personal attendants of the queen, and form part of her court. The bedchamber women are subordinate to them. The maids of honor are the immediate attendants of the queen, and accompany her on all occasions. There are other officers attached to the royal household: the dean and subdean of the chapel, with their clerks and chaplains; and, in the medical service, the physicians in ordinary and extraordinary, and surgeons, apothecaries, oculists, dentists, druggists, and chemists. These various officers comprise the queen's household; but in addition to these there are establishments for the prince of Wales and for other members of the royal family. The annuities of the whole family are as follows: the queen, £385,000; prince of Wales, £40,000; princess of Wales, £10,000; crown-prince of Prussia, £8,000; duke of Edinburgh, £25,000; princess Christian of Sleswick-Holstein, £6,000; princess Louise (Marchioness of Lorne), £6,000; duke of Connaught, £25,000; prince Leopold, £15,000; duchess of Cambridge, £6,000; duchess of Mecklenburg-Strelitz, £3,000; duke of Cambridge, £12,000: duchess of Teck, £5,000.

HOUSEHOLD GODS, deities supposed among the Romans to preside over their houses, and called *penates*. Among these were Jupiter and Juno. Some of the penates were called lares, regarded as the genii of the family; one of these was Vesta, the guardian of domestic unity.

HOUSEHOLD SUFFRAGE, in English law a necessary qualification for a voter is that he shall be a householder or housekeeper. Male citizens of proper age who have been for 12 months occupiers of a distinct dwelling or part of a dwelling, and have paid assessed rates, are entitled to vote. The suffrage extends also to lodgers occupying uninterruptedly for a similar period, presuming that such lodgings let unfurnished would bring £10 a year.

HOUSEHOLD TROOPS are those troops whose especial duty it is to attend the sovereign, and to guard the metropolis. These forces comprise three regiments of cavalry—the 1st and 2d life-guards, and the royal horse-guards, and three regiments of foot-guards (which include seven battalions), the Grenadier, Coldstream, and Scots Fusilier guards. The cost of these corps, for pay and allowances only, reaches the sum of £230,000 a year; and they number in all ranks 1302 cavalry and 5,950 infantry, who are justly held to be the flower of the British army.

HOUSE-LEEK, *Sempervivum*, a genus of plants of the natural order *crassulaceæ*, having a calyx of 6 to 20 sepals, the petals equal in number to the sepals, and inserted into the base of the calyx; the leaves generally very succulent, and forming close rosettes. The COMMON HOUSE-LEEK, or CYPHEL (*S. tectorum*), called *jous* or *jouds* in Scotland, and in some countries *Jupiter's beard*, grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, etc. It sends up leafy flowering stems of 6 to 12 inches in height, bearing branches of pale-red star-like flowers, equally curious and beautiful. The leaves cut or bruised, and applied to burns, afford immediate relief; as they do also in stings of bees or wasps; and they are a beneficial application to ulcers and inflamed sores. They were formerly in high esteem as a remedy for fevers and other diseases, and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. The edict is in these words: *Et habeat quisque supra domum suam Jovis barbam* (and let everybody have the Jupiter's beard on his house).—Other species possess similar properties. *S. soboliferum*, with yellowish-green flowers, is very frequently planted on walls in Germany. Some of the species, natives of the s. of Europe, Canary isles, etc., are shrubby; others are common green-house plants.

HOUSE OF LORDS. See PARLIAMENT.

HOUSEMAID'S KNEE is the term commonly applied to an acute inflammation of the bursa or sac that intervenes between the patella, or knee-pan and the skin. Housemaids are especially liable to it from their kneeling on hard damp stones. It causes considerable pain, swelling, and febrile disturbance. The only disease for which it can be mistaken is acute inflammation of the synovial membrane lining the cavity of the joint; but in this disease, the patella is thrown forwards, and the swelling is at the sides, while in housemaid's knee, the swelling is very superficial, and is in front of the patella.

The treatment consists essentially in the means usually employed to combat inflammation; viz., rest, leeches, fomentations, and purgatives; if suppuration take place, the sac must be freely opened, and the pus evacuated.

HOUSE-RENTS, in Scotland, when the lease is verbal, prescribe in three years—i.e., no action can be maintained after that time; but in England an action can be brought within six years. See LANDLORD AND TENANT.

HOUS'SA, or, according to Dr. Barth, HÁUSA, a district of Africa, in Sudan, forming a portion of the empire of Sókoto (q.v.). The name, however, is used to designate rather the race inhabiting the district, and the language which there prevails, than to mark any distinct political division. Houssa proper comprises seven states. The country of the Houssa is very beautiful, and the inhabitants lively, spirited, and industrious. See Barth's *Travels and Discoveries in North and Central Africa.*

HOUSSAYE, ARSÈNE, b. France, 1815, a poet and art critic. When only 15 years of age he joined the French army which was then besieging Antwerp. For the next three or four years he lived in Paris in extreme poverty, but in 1836 he appeared as an author in *Couronne de Bluets*, a novel. Becoming connected with the *Revue de Paris*, he commenced the publication of his *Men and Women of the Eighteenth Century* in that serial and afterwards republished it in two volumes; and in 1846 he published his *History of Dutch and Flemish Painting*. On the accession of Louis Napoleon, Houssaye was appointed to the direction of the theater Français and continued in that office till 1856. Among his works are *L'Histoire du Quarante-et-unième Fauteuil de l'Academie Français*, a series under the title *Parisiennes*, and many novels. He was decorated with the cross of the legion of honor in 1846, and made grand officer in 1858.

HOUSTON, a co. in s.w. Georgia, w. of the Ocmulgee river, intersected by the South-western railroad; 875 sq.m.; pop. '70, 20,406—15,332 colored. It has an undulating surface and much of it is still woodland. The chief productions are cotton, corn, and pork. Co. seat, Perry.

HOUSTON, the extreme s.e. co. of Minnesota on the Iowa border, traversed by the Southern Minnesota railroad, and bounded e. by the Mississippi; 575 sq.m.; pop. '75, 16,566. The surface is undulating and largely covered with forests; soil fertile; chief productions: wheat, corn, oats, and hay. Co. seat, Caledonia.

HOUSTON, a co. in n.w. Tennessee on the Cumberland and Tennessee rivers, crossed by the Louisville and Great Southern railroad; 350 sq.m.; organized since the census of 1870. Surface is hilly; main productions: corn and tobacco. Co. seat, Erin.

HOUSTON, a co. in e. Texas between Trinity and Neches rivers, intersected by the International and Great Northern railroad; 1090 sq.m.; pop. '70, 8,147—3,542 colored. It has a hilly surface largely covered with forests. Cotton and corn are the staple products. Co. seat, Crockett.

HOUSTON, a city in Texas, United States of America, at the head of steam-boat navigation on Buffalo bayou, 45 m. from its mouth in Galveston bay, and 80 m. from Galveston. It has iron foundries, machine-shops, and cotton-presses, and exports cotton, cattle, and agricultural products. Pop. '70, 9,382.

HOUSTON, a city, the seat of justice of Harris co., Texas; the great railroad center of the state, 46 m. n.w. of Galveston; pop. '70, 9,382; in '80, 16,750. There is steam-boat communication with Galveston. The city has more than a dozen churches, a convent, an academy, six banks, two cotton factories, machine-shops, planing-mills, etc. It is a great shipping place for cotton.

HOUSTON, SAM, gen. and ex-president of Texas, was b. near Lexington, Rockbridge co., Va., Mar. 2, 1793; enlisted as a common soldier in the war of 1812; was chosen ensign, and fought under Jackson with a courage that won his lasting friendship. In 1823 he was chosen member of congress, and in 1827 governor of Tennessee. In Jan., 1829, he married the daughter of an ex-governor; and in the following April, for reasons never made public, abandoned wife, country, and civilization, was adopted as a son by the chief of the Cherokee nation, beyond the Mississippi, and was formally admitted as a chief. In 1832 he went to Washington and procured the removal of several United States Indian agents, on charges of fraud, but got into personal difficulties with their friends. The Texan war offered a new field to his ambition. Houston was made commander-in-chief. The Americans at first sustained some severe defeats, and Houston was obliged to retreat before the Mexicans under Santa-Anna for nearly 300 m., but suddenly turning on his pursuers, Houston fought the remarkable and decisive battle of San Jacinto, April 21, 1836, at one blow annihilated the Mexican army, and achieved the independence of Texas. The hero of San Jacinto was elected first president of Texas, and re-elected in 1841, and on the annexation of Texas to the United States, in 1845, was sent to congress. In 1859 he was elected governor of Texas. He opposed secession, but retired to private life when opposition was fruitless. He died in 1862.

HOUSTON, SAM (*ante*). Although Houston achieved his public reputation mainly through his connection with the history of Texas, yet his life, prior to his settlement in that country, was filled with most romantic incidents, tending to illustrate the strong, original character of the man, and his devotion to his country, and to principles of integrity, as a man and as a citizen. From the time when he commenced the study of law in Nashville (about 1814) to the year 1827, when he was elected governor of Tennessee, he was in a remarkable degree the subject of political preferment. He rose from office to office, being made a member of congress in 1823, when only thirty years of age, and was already esteemed as one whose future promised the highest honors. In 1828 Houston was married to an estimable and beautiful young lady, and surprised the country by leaving her on the day following that of the ceremony, resigning his office of governor of the state, and retiring to the wilds of Arkansas to enable his wife to procure a divorce on the ground of desertion. The secret of this strange action was only made known in the present year (1880), when it was learned from an authentic source that Houston had discovered a prior attachment on the part of his wife, who would appear to have been coerced into her marriage with him, and that, with the natural nobility of his nature, he had willingly sacrificed himself, his social ties, and his political aspir-

ations, to the end that the woman he loved might be made happy. His bride procured the divorce necessary, and some time after married the man of her choice. Houston's conduct was commented upon in terms the most severe, and stories to his disadvantage were freely circulated and generally believed. In the meantime he had made his residence in the Cherokee country, and a year later was the representative of the tribe at Washington. His connection with Texas affairs occurred through a casual visit a year or two after this period, and he was the delegate of the 20,000 Americans—the outgrowth of the Connecticut colony in Texas—to the convention for revision of the Mexican constitution. Houston resisted secession from its inception, and it is an interesting incident in his life, and in the history of his country, that of his riding close beside the carriage in which sat Lincoln and Buchanan, on the day of the inauguration of the former, guarding the president-elect from the possibility of assassination—which was even then threatened, as it was afterwards consummated. The picture of this stalwart old man, nearly three score and ten, armed and watchful, guarding the person of Abraham Lincoln, is one that deserves to be perpetuated in American history.

HOVELERS. See DEAL BOATMEN.

HO'VEN, or distention of the rumen or first stomach with gas, is a common complaint among cattle and sheep, and results from the eating of food to which the animal has been unaccustomed, from wet clover or vetches, or from any easily fermentable food. Relief generally follows walking exercise, friction on the belly, and a dose of any ordinary stimulant, which for a cow may consist of a couple of ounces of turpentine, whisky, ether, or ginger, to which should also be added, in order to clear the bowels of the offending food, a laxative, such as a pint of oil or a pound of salts. A fourth or fifth of these quantities will suffice for sheep. The introduction of the probang, with the small end downwards, allows the escape of gas when there is little food in the stomach. If simple remedies fail, the breathing becomes distressed, and the animal stupid; the gas may with safety be allowed to escape by an external opening made at a point intermediate between the last rib, the lumbar vertebræ, and the prominence of the haunch, either with a canula and trochar, or a large pocket or table knife. For several days after an attack of hoven, the digestive organs are apt to be easily deranged, and the animal must have soft and digestible food, and an occasional dose of simple laxative medicine.

HOVEY, ALVAH, b. Vt. 1820; graduated at Dartmouth; studied theology, and became pastor of a Baptist church in Maine. In 1850 he was a teacher in the Newton theological institution; in 1853, professor of theology and Christian ethics. He has published *Life of Chrysostom; The State of the Impenitent Dead; The Scriptural Law of Divorce; Religion and the State,* and other works.

HOVEY, ALVIN P., b. Ind. 1821; brought up to the study and practice of law. He served in the war of the rebellion as an officer of volunteers, and rose to brevet maj. gen. In 1866 he was appointed U. S. minister to Peru.

HOWARD, a co. in s.w. Arkansas, drained by a branch of Little river; formed after 1870. It has a generally level surface and fertile soil. Co. seat, Center Point.

HOWARD, a co. in n.w. Dakotah, on the Montana border, bounded on the n. by the Missouri and intersected by Little Missouri river. Area 3,500. Population not ascertained.

HOWARD, a co. in central Indiana, traversed by the Pittsburg, Cincinnati, and St. Louis, and the Indianapolis, Peru, and Chicago railroads; 300 sq.m.; pop. '70, 15,847. It has a level surface, much of it covered with forests, and the soil is fertile. Chief productions: wheat, corn, and pork. Co. seat, Kokomo.

HOWARD, a co. in n. Iowa, on the border of Minnesota, drained by the Upper Iowa river, and intersected by the Milwaukee and St. Paul railroad; 430 sq.m.; pop. '80, 10,837. It has a surface divided into prairie and woodland, and the soil is fertile. The main products are wheat, corn, and oats. Co. seat, Cresco.

HOWARD, a co. in Kansas, bounded on the s. by Indian territory; drained by Fall river and Suicide creek; 1271 sq.m.; pop. '70, 2,794. The soil is fertile, producing wheat, corn, etc. Co. seat, Elk Falls.

HOWARD, a co. in central Maryland, on Patapsco and Patuxent rivers, and the Baltimore and Ohio railroad; 275 sq.m.; pop. '70, 14,150–3,474 colored. The surface is hilly, and the soil fertile; productions: corn, wheat, oats, pork, etc. Co. seat, Ellicott City.

HOWARD, a co. in n. central Missouri, on the Chariton and Missouri rivers, crossed by the Missouri, Kansas, and Texas railroad; 470 sq.m.; pop. '80, 18,428–5,233 colored. The surface is undulating, and the soil is fertile; chief productions: corn, wheat, and tobacco. Co. seat, Fayette.

HOWARD, a co. in e. central Nebraska, on tributaries of Platte river; pop '76, 1680. The surface is mostly prairie. Co. seat, St. Paul.

HOWARD, a co. in n.w. Texas, situated on one of the forks of the Colorado; 900 sq.miles. There are no permanent white settlers at present.

HOWARD. The noble house of Howard has stood for many centuries at the head of the English nobility. The Howards have enjoyed the dukedom of Norfolk since the middle of the 15th c., and have contributed to the annals of the nation several persons of the most distinguished character both in politics and in literature. Neither sir W. Dugdale, nor Collins, nor sir Bernard Burke claims for the Howards any more ancient origin than sir William Howard, a learned chief-justice of the common pleas under Edward I. and Edward II., though Dugdale incidentally mentions a tradition that their name is of Saxon origin, and derived either from an eminent office under the crown before the conquest, or from Hereward, the leader of those forces which for a time defended the isle of Ely so valiantly against William the conqueror. Be this as it may, it is certain that sir John Howard, the grandson of the above-mentioned judge, was not only admiral and captain of the king's navy in the n. of England, but sheriff of Norfolk, in which county he held extensive property, which was subsequently increased by the marriage of his grandson, sir Robert, with the co-heiress of the ancient and noble house of Mowbray, dukes of Norfolk. The only son of this union was sir John Howard, one of the leading supporters of the house of York, who, having gained early distinction in the French wars of Henry VI., was constituted by Edward IV. constable of the important castle of Norwich, and sheriff of Norfolk and Suffolk. He subsequently became treasurer of the royal household, obtained "a grant of the whole benefit that should accrue to the king by coinage of money in the city and tower of London, and elsewhere in England;" and further, was raised to the peerage as lord Howard and duke of Norfolk. We find him in 1470 made capt.gen. of the king's forces at sea, and he was most strenuous in that capacity in his resistance to the house of Lancaster. Finally, he was created earl marshal of England, an honorary distinction still borne by his descendants, and in 1484 was constituted lord admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and, after his death, his honors were attainted, as also were those of his son Thomas, who had been created earl of Surrey. The latter, however, after suffering three years of imprisonment in the tower of London, obtained a reversal of his own and his father's attainders, and being restored to his honors accordingly, became distinguished as a general, and is more particularly celebrated in history for his defeat of the Scotch at Flodden in 1513. His son Thomas, third duke of Norfolk, was attainted by Henry VIII., though afterwards restored in blood, and by his marriage with a daughter of king Edward IV., became the father of the ill-fated and accomplished earl of Surrey, whose execution was the last of the many acts of tyranny which disgrace the memory of Henry VIII. Eminent as a statesman, a warrior, and a poet, Surrey is thus described by sir Egerton Brydges: "Excellent in arts and in arms; a man of learning, a genius, and a hero; of a generous temper and a refined mind, he united all the gallantry and unbroken spirit of a rude age with all the elegance and grace of a polished era. With the greatest splendor of descent, in possession of the highest honors and unbounded wealth, he relaxed not his efforts to deserve distinction by his personal worth. Conspicuous in the rough exercises of tilts and of tournaments, and commanding armies with skill and bravery in expeditions against the Scots under his father, he still found time, at a period when our literature was rude and barbarous, to cultivate his mind with all the exquisite spirit of the choicest models of Greece and Rome, to catch the excellences of the revived muses of Italy, and to produce in his own language compositions which, in simplicity, perspicuity, graceful ornament, and just and natural thought, exhibit a shining contrast to the works of his predecessors, and an example which his successors long attempted in vain to follow."

The earl of Surrey was executed during the lifetime of his father, on whom the same sentence had been passed, when the death of the royal tyrant saved him from the block. His grandson, Thomas, fourth duke of Norfolk, in like manner suffered attainder, and was executed on Tower hill for high treason, for his communication with Mary queen of Scots. The family honors, however, were again restored, partly by James I., to his grandson, and partly by Charles II., to his great-great-grandson, Thomas, who thus became eighth duke, and whose cousin and successor, Charles, ninth duke, was the direct ancestor of the present duke of Norfolk.

It would be impossible here to give a list of all the honors which from time to time have been conferred on various branches of the ducal house of Howard; it is sufficient to say, that in one or other of their widespread branches, the Howards either have enjoyed within the last three centuries, or still enjoy, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Effingham.

It will be seen from the above remarks that the ducal house of Norfolk is one whose fate it has been, beyond all others among the English nobility, to find its name interwoven with the thread of English history, and not rarely in colors of blood. The accomplished but unfortunate Surrey, and his scarcely less unhappy father, Thomas Howard—whose head was only saved from the block on which his son so nobly suffered by the death of the eighth Henry—are "household words" in the pages of English history; and readers of Shakespeare will have other recollections of the same name allied with other historical events; while those who are familiar with the writings of Pope,

will not have forgotten how tersely and pointedly he typifies the glory of ancestral pedigrees by

All the blood of all the Howards.

Other members of the house of Howard have gained a place in the pages of English history. Sir Edward Howard K.G., brother of the first earl of Surrey, was made by Henry VIII. the king's standard-bearer and admiral of the fleet, in which capacity he lost his life in boarding a French vessel off Brest in action in 1513; his brother, sir Edmund, acted as marshal of the horse at Flodden; and his half-brother, sir Thomas Howard, was attainted, and died a prisoner in the tower, for aspiring to the hand of the lady Margaret Douglas, daughter of Margaret, queen of Scotland, and niece of Henry VIII., one of whose ill-fated consorts was the lady Catharine Howard.

HOWARD, CATHARINE, 1520–42; fifth wife of Henry VIII. She was a daughter of Edmund Howard, third son of the duke of Norfolk. The king married her soon after the divorce of Anne of Cleves, in 1540. She was accused of adultery, and after a trial, in which her guilt seems to have been established beyond doubt, she was executed Feb. 13, 1542.

HOWARD, CHARLES, Lord Howard of Effingham, 1536–1624; b. England, son of lord William Howard, then lord high admiral, under whom he served with distinction. He succeeded his father in command just before the appearance of the Spanish armada, and it was mainly owing to his valor that the formidable enemy was defeated. In 1595 he commanded the expedition against Cadiz. In 1599, when England was again threatened by Spain, and Essex in Ireland appeared to encourage disaffection, Howard was made lieut.gen. of the kingdom, with full command of the army and navy. A few years later he resigned his office in favor of Villiers, duke of Buckingham.

HOWARD, JACOB MERRITT, LL.D., 1805–71; b. Vt., graduated at Williams college in 1830. He was for some time a teacher in an academy in Massachusetts. In 1833 he was admitted to the bar in Michigan, where he had settled. Five years later he was chosen to the legislature; in 1841 was a member of congress; and U.S. senator from 1862 to 1871. He is credited with having originated the name of the republican party, and is said to have written its first platform.

HOWARD, JOHN, "the philanthropist," was born at Hackney, near London, about 1726. From his father, who had been engaged in trade, Howard inherited a considerable fortune. In 1756, the year of the great earthquake at Lisbon, urged by motives of benevolence, as well as of curiosity, he set sail for that city. On this voyage his vessel was taken by a French privateer, and he was carried into the interior, when he suffered imprisonment for some time. The hardships which he here underwent, combined with the knowledge of prisons and the miseries of prison-life which he acquired as a county sheriff in 1773 and afterwards, determined him in devoting himself to prison reform. His life hereafter is but a chronicle of his journeys throughout the United Kingdom and the continent, in which he visited the principal prisons and hospitals. His chief work is *An Account of the Lazarettos in Europe, etc., with Remarks on the present State of the Prisons in Great Britain and Ireland* (1789). He died Jan. 20, 1790, at Kherson, in the s. of Russia, from having caught infection from a fevered patient for whom he had prescribed. The fame of Howard is peculiar. He is remembered not so much for his talents as for that devotion to his suffering fellow-men, in which he expended his fortune and his life.

HOWARD, JOHN EAGER, 1752–1827; b. Md.; a soldier in the war of the revolution, and commanded a regiment at Germantown, where he did gallant service. At the battle of the Cowpens he saved the fortunes of the day by a brilliant bayonet charge, said to have been the first effective use of the bayonet by the patriots. He was voted a medal by congress for this service. He was severely wounded at Eutaw, and gained distinction in other battles. After the return of peace he was a member of congress, governor of Maryland, and U. S. senator. When war with France was imminent Washington appointed him a brig.gen.

HOWARD, OLIVER OTIS, LL.D., b. Me., 1830; graduated at Bowdoin college in 1850, and at West Point in 1854, and entering the army was first engaged in field duty in the Florida Indian war. He returned to the academy, and was for a time assistant-professor of mathematics. In June, 1861, he was made col. of volunteers, and commanded a brigade at the battle of Bull Run. In the same year he rose to brig.gen.; continued in active service in the Virginia campaign, and lost an arm at the battle of Fair Oaks. In Nov., 1862, he was made maj.gen. of volunteers, and at Chancellorsville and Gettysburg commanded the second army corps. In 1863 he was in Tennessee, and participated in the battles of Lookout Mountain and Missionary Ridge. In 1864, he commanded the fourth corps in the army of the Cumberland, and in July was concerned in the engagements at Dalton, Resaca, and Kenesaw Mountain; he assisted in the siege of Atlanta, and in further operations under Sherman in the march to the sea. After the close of the war he was detailed to serve as commissioner of the Freedman's Bureau, and held that office until June, 1872. He was afterwards a special commissioner of Indian affairs, and from 1869 to 1873 president of Howard university. Since 1873 he has served on the Indian frontier. In Dec., 1868, he was

made a brig.gen. in the regular army, and the next year brevet maj.gen. In 1881, by appointment of the president, he took command at West Point, including the military academy, relieving maj.gen. Schofield.

HOWARD UNIVERSITY, in Washington, D.C., was organized by act of congress in 1867, and named from gen. O. O. Howard, one of its most conspicuous founders, and its first president. It is intended for the higher education of negro students, but its laws make no formal distinction, in regard to color or sex, as to teachers or scholars. The university buildings are beautifully situated on very high ground 2 m. from the business center of the city, facing the university park. The principal building is of gray brick and is four stories high, containing recitation and lecture rooms, chapel, library, philosophical rooms, museum, and offices. The medical building is on the s. side of the park. Miner hall, set apart for ladies, will accommodate 140 students, and has rooms in connection with it for matron and teachers. Clark hall, for young men, accommodates 200 students. The general library contains about 7,000 volumes, many of them choice and select works. The professional departments have separate libraries. The mineral cabinet contains over 4,000 specimens, including fossils, minerals, etc. The museum contains a collection of coins, medals, and curiosities, specimens of valuable woods, Indian relics, portraits of distinguished men and women, views of the late war, engravings, and photographic views of classic ruins in Rome. The medical department has 7 professors and 3 lecturers; the theological department 3 professors and 1 lecturer; the classical, preparatory, and normal departments have 2 professors and 3 teachers; the law department 3 professors, and the collegiate department 3. The number of students in 1880 was 250. A majority of the medical students are white. The theological department is under the joint supervision of the presbytery of Washington and of the American missionary association (Congregational). The general management of the institution is vested in a board of 21 trustees. It has an income of $8,500 per annum from interest and rent of buildings, and in 1880 was aided by congress to the amount of $10,000. President, Rev. Wm. W. Patton, D.D.

HOWE, EARL (RICHARD HOWE), British admiral, was the second son of Emanuel Scrope, second viscount Howe of the Irish Peerage. He was born in 1725, and educated at Eton. Having a boyish passion for the sea, he left Eton at 14, and went to the south seas in the squadron under Anson. He was with admiral Vernon in 1745, and at the time of the Scottish rebellion, being in command of the *Baltimore* sloop, took part in the siege of fort William. He also, with another vessel, beat off two French ships conveying troops and ammunition to the pretender, for which he was made post-captain. In 1755 his ship, the *Dunkirk*, captured the *Alcide*, a French 64, off Newfoundland. He next served under sir E. Hawke in the expedition against Rochefort. He was ordered to attack the fort on the isle of Aix with his ship the *Magnanime*, compelled it to surrender after an hour's cannonade, and achieved the only material success which attended the expedition. He was commodore of the squadron which sailed in 1758 for St. Malo. The troops were landed and re-embarked without loss, after destroying all the magazines and shipping in the port to the number of 120 sail. In the same year he took Cherbourg. Nearly 200 pieces of iron cannon and mortars were here rendered unserviceable; the brass cannon were brought to England; the celebrated basin was destroyed, and 27 ships and vessels were burned or sunk. A second attack upon St. Malo was less successful. The French troops assembled in force at the bay of St. Cas, and it was only by the intrepidity of Howe, who went in his own barge into the center of the enemy's fire, that the re-embarkation of the rear-guard was effected, with great loss of life. In 1758 he succeeded to the Irish title of viscount, on the death of his brother, the brig.gen., who was killed before Ticonderoga. He took part in the defeat of the fleet under the marquis de Conflans, and captured the *Hero*, 74 guns. In 1760 he was made col. of the Chatham division of marines, and afterwards a lord of the admiralty, and treasurer of the navy. In 1776 he commanded a fleet on the American coast, when the conquest of New York, Rhode Island, Philadelphia, and every settlement within the reach of a naval force, testified to his skill and energy. In 1778 he defended the American coast against a superior naval force under D'Estaing. He was made a viscount of Great Britain in 1782, and sent out with a fleet to relieve Gibraltar. He succeeded in disembarking troops, ammunition, and supplies, and then offered battle to the combined fleets of France and Spain, which declined an engagement. He was made first lord of the admiralty in 1783, and received an English earldom in 1788. When war with France broke out in 1793 he took the command of the channel fleet, and next year gained the victory which will long be known as that of "the glorious first of June." The French fleet consisted of 26 ships of the line, and the English of 25. Howe in his flag-ship, the *Queen Charlotte*, engaged in the Bay of Biscay, off Ushant, the French admiral, who in less than an hour crowded all the sail he could carry, followed by as many of his ships as could get away. The English captured two ships of 80 guns, and four 74's; another 74 sank immediately after she was taken possession of. London was illuminated three nights in honor of the victory. The thanks of parliament were voted to Howe. George III. visited him on board the *Queen Charlotte*, gave him a sword, and made him a knight of the garter. His last service was in bringing back the mutinous seamen at Portsmouth to their duty in 1797. He died August 5, 1799, aged 74, leaving a name high in the roll of English naval worthies.

HOWE, ELIAS, 1819-67; b. Mass.; brought up as a farmer and a miller, received his education in the common schools. In Lowell he first found employment in a manufactory of cotton machinery, and in Boston worked in an ordinary machine shop. Here he conceived the idea of the sewing-machine, which he perfected in May, 1845, and patented Sept. 16, 1846. It was not well received by the public, and the following year he went to England, where he was equally unsuccessful. After an absence of two years he returned in great poverty to find that others were profiting by his invention; but he continued working at the machine, devoting such means as he obtained to the prosecution of the people who had infringed upon his patent. His perseverance was at last crowned with success, and in 1854 his claim to priority of invention was legally established. Thenceforth his career was one of prosperity, and an income sometimes reaching nearly a quarter of a million of dollars per year repaid him for long effort and privation. Before the expiration of the patent in 1867 he had accumulated more than $2,000,000. In the war of the rebellion Howe served as a common soldier in a Connecticut company, and on one occasion when the pay of the regiment was delayed he advanced the money himself.

HOWE, GEORGE AUGUSTUS, 1724–58; b. England, and came to America in command of a British regiment in July, 1757, at the close of which year he was made brig.gen. In July, 1758, he was killed in a skirmish with the French at lake George. A monument in Westminster abbey, paid for by the colony of Massachusetts, has been erected in his honor.

HOWE, JOHN, who has been called the *Platonic Puritan*, was b. May 17, 1630, at Loughborough, in Leicestershire, to the living of which parish his father had been presented by Laud. He studied both at Cambridge and Oxford, and after preaching for some time at Winwick, in Lancashire, and Great Torrington, in Devonshire, he was appointed domestic chaplain to Cromwell in 1656, in which difficult situation his conduct was such as to win praise even from the enemies of his party. At the restoration he returned to Torrington, where the position he had held during the commonwealth made him an object of close suspicion to the government. The *Act of Uniformity*, however, ejected him from his parish, Aug. 24, 1662, and he wandered about preaching in secret till 1671, when he was invited by Lord Massarene, of Antrim castle, in Ireland, to become his domestic chaplain. Enjoying there the friendship of the bishop of that diocese, and liberty to preach in all the churches under his jurisdiction, he wrote his *Vanity of Man as Mortal*, and began his greatest work, *The Good Man the Living Temple of God* (1676–1702), which occupies one of the highest places in Puritan theology. In 1675 he was called to be pastor of the dissenting congregation in Silver street, London, and went thither in the beginning of 1676. In 1677 he published, at the request of Mr. Boyle, *The Reconcilableness of God's Prescience of the Sins of Men with the Wisdom of His Counsels and Exhortations;* in 1681, *Thoughtfulness for the Morrow;* in 1682, *Self-dedication;* in 1683, *Union among Protestants;* and in 1684, *The Redeemer's Tears wept over Lost Souls.* In 1685 he was invited by Lord Wharton to travel with him on the continent; and after visiting the principal cities, he resolved, owing to the state of England, to settle for a time at Utrecht, where he was admitted to several interviews with the prince of Orange. In 1687 the *Declaration for Liberty of Conscience* induced him to return to England, and at the revolution next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, in 1693, *Carnality of Religious Contention;* in 1694–95, several treatises on the Trinity; in 1699, *The Redeemer's Dominion over the Invisible World;* and he continued writing till 1705, when he published *Patience in Expectation of Future Blessedness.* He died April 2, 1706.—See Henry Rogers's *Life and Character of John Howe, with an Analysis of his Writings.*

HOWE, JULIA WARD, b. N. Y., 1819; daughter of Samuel Ward, and widow of the late Dr. Samuel G. Howe, the Boston philanthropist, whom she married in 1843. Her education was the best afforded to girls of her time, and at an early age she gave evidence of superior literary ability and taste; and after her marriage to Dr. Howe she became warmly interested in moral, social, and political subjects. She was an early champion of the equal rights of women, and has written and spoken extensively, in Europe and the United States, in advocacy of woman suffrage. She has also labored extensively in the cause of peace at home and abroad, with a view to the formation of a public sentiment in favor of settling international disputes by arbitration. She has often spoken in the pulpit upon religious themes. In Europe she is one of the best-known women of America. Her principal works, in addition to two volumes of travel and observation and numerous papers in magazines and journals, are: *Passion Flowers; Later Lyrics; Words for the Hour;* and two dramas, *The World's Own* and *Hippolytus.* Her *Battle Hymn of the Republic* was sung by union soldiers at thousands of camp-fires, as well as by popular assemblies all over the north, during the war of the rebellion.

HOWE, SAMUEL GRIDLEY, M.D., an American physician, was b. at Boston, Nov. 10, 1801, and educated at the Boston Latin school and Brown university, where he graduated in 1821. He then studied medicine. Being an admirer of lord Byron, he wished to join him in aiding the Greek revolution, and embarked from Boston for Greece in 1824; volunteered as a surgeon; served two years as a guerrilla; organized the medical staff

of the Greek army, and was appointed its chief. The Greeks were suffering for supplies, and even for food; and he went to America and raised large contributions. Returning with food, clothing, and supplies, he formed the colony of Corinth, in which he filled all offices, from governor to constable. Taken down with the swamp-fever in 1830, he went to Paris, where he attended medical lectures, and in 1832 returned to the United States. Having become interested in the education of the blind, he was sent to Europe to examine the best institutions, but volunteered in the Polish insurrection, and spent six weeks in a Prussian prison. On his return, the Massachusetts institution for the blind was established and placed under his management. He also established a school for idiots, and in 1828 published a *Sketch of the Greek Revolution*. He revisited Greece in 1867, bearing supplies to the Cretans, then struggling for their independence. He died 1876.

HOWE, SIR WILLIAM, Viscount, 1729–1814; an English officer who served under Wolfe in the conflict on the heights of Abraham (Quebec), 1759. In the beginning of the American revolution he succeeded Gage as British commander-in-chief, and was in charge at the Bunker-hill fight. After the defeat of the Americans in the battle of Long Island and their retreat from New York, Howe took possession of the city, remaining there until succeeded by sir Henry Clinton, May, 1778. On the death of his brother Richard he succeeded to a baronetcy, and was a privy councilor at the time of his death.

HOWELL, a co. in s. Missouri, on the Arkansas border, drained by Spring river; 900 sq.m.; pop. '70, 4,218—24 colored. It has a hilly surface, and is to a large extent covered with forests. The soil is tolerably fertile. Chief productions: corn and pork. Co. seat, West Plains.

HOWELL, JOHN C., b. Philadelphia, 1819; entered the navy as a midshipman in 1836; rising to commander in 1862, and commodore in 1872. At the capture of fort Hatteras he was executive officer of the steam frigate *Minnesota*, and at fort Fisher he was in command of the *Nereus*. After the war he was placed in command of navy-yards, and in 1874 was appointed chief of the bureau of yards and docks.

HOWELLS, WILLIAM DEAN, b. Ohio, 1837; the son of a printer and himself brought up to that trade. He passed naturally to the editorial desk, and was a writer on the *Cincinnati Gazette* and the Columbus *State Journal*. In the mean time he became a contributor (chiefly of verse) to the *Atlantic Monthly*, and in unison with John J. Piatt he wrote *Poems of Two Friends*. President Lincoln sent Howells to Venice as consul, where he remained until the accession of Johnson to the executive chair. Soon after his return he became assistant editor of the *Atlantic Monthly*, and in 1871 was chosen sole editor, a position which he still retains. Some of his publications are *Venetian Life; Italian Journeys; No Love Lost; Suburban Sketches; Their Wedding Journey; A Chance Acquaintance;* and *The Undiscovered Country*.

HOWITT, WILLIAM and MARY, two English authors that may most properly be treated together. William Howitt was born in 1795 at Heanor, in Derbyshire, and was educated at various schools in connection with the society of Friends, to which persuasion his family belonged. In his youth he was fond of outdoor sports, and he celebrated in verse the scenery with which he was familiar. In 1823 he married Miss Mary Botham, a lady of literary taste and acquirements, and whose family, like his own, was attached to the principles of Quakerism. *The Forest Minstrel*, with their joint names on the title-page, was published during the year in which they were married. For three or four years thereafter they employed themselves in contributions to annuals and magazines, and in 1827 a selection from these fugitive pieces appeared under the title of *The Desolation of Eyam*. From this date till 1837 William Howitt wrote *The Book of the Seasons, Popular History of Priestcraft*, and *Tales of the Pantika*. During the same period Mary Howitt produced *The Seven Temptations* and a country novel entitled *Wood-Leighton*. In 1837 William and Mary Howitt removed to Esher, in Surrey, and at that place William Howitt wrote *Rural Life in England; Colonization and Christianity; Boy's Country Book;* and *Visits to Remarkable Places*, first series. Mary Howitt at the same time employed herself in writing *Tales for Children*, many of which are popular. In 1840 William Howitt, with his wife and family, removed to Heidelberg, where they resided two years. Mary Howitt made herself mistress of the northern languages, and translated the works of Miss Bremer and Hans C. Andersen. Meanwhile William Howitt wrote and translated novels; he also published *The Aristocracy of England* and *The Homes and Haunts of the British Poets*. In 1852 he went to Australia, where he remained two years. In the last years of his life, his wife and he (both become converts to spiritualism) lived in Italy. William died at Rome, Mar. 3, 1879. Among his later works are: *Law, Labor, and Gold, or Two Years in Victoria; The Ruined Abbeys of Great Britain; The Northern Heights of London; The Illustrated History of England*, 6 vols., completed in 1861; *History of the Supernatural in all Ages and Nations* (1863); *Discovery in Australia, Tasmania, and New Zealand* (1865); and *The Mad War Planet and other Poems* (1871).

HOWITZERS are guns which came into use early in the history of field-artillery, as portable instruments for discharging shell into a hostile force. As, for this purpose, no

great range was necessary, a small charge of powder sufficed; and the howitzer could be made, in proportion to its large bore, extremely light. It combines in some degree the accuracy of a cannon with the caliber of a mortar; and, while equally effective at short ranges, is far more portable than either. That the powder, on its expansion, may act with full force on the shell, it is confined in a hemispherical chamber of smaller diameter than the rest of the bore, the mouth of which is completely closed by the shell when rammed home. The Coehorn howitzer, much used in India for mountain service, is a small gun, light enough to be borne by a horse up hilly defiles, etc.

HOWLER, HOWLING MONKEY, or STENTOR (*mycetes*), *alouatte* of the French, a genus of American monkeys, remarkable for the dilatation of the hyoid (q.v.) bone into a hollow drum, which communicates with the larynx, makes a conspicuous external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds, which are heard miles away, and to which all their names refer. They live chiefly among the branches of trees, and take extraordinary leaps from one to another, taking hold by the tail as readily as by the hands, and often swinging by it alone. They are gregarious, and unite their voices in concert, so as to produce a most deafening noise. The monkeys of this genus are regarded as in their low intelligence and their fierceness of disposition American representatives of the baboons, whilst in many of their habits they more nearly accord with the gibbons of the old world. They inhabit the north-eastern parts of South America. They are the largest monkeys in the new world. There are not many species.

HOWSON, JOHN SAUL, D.D., b. England, 1816; graduated at Cambridge; in 1845 took holy orders, and afterwards became senior classical master in Liverpool college. From 1849 to 1865 he was principal of that college. In 1867 he became dean of Chester. He is best known from his *Life and Epistles of St. Paul*, written in conjunction with Rev. W. J. Conybeare. He has also written *The Character of St. Paul* and *The Metamorphoses of St. Paul.*

HOWTH, a small peninsula on the e. coast of Ireland, forms the n. shore of the bay of Dublin, and is 2½ m. long by about 2 m. broad, with an area of about 2,600 acres. Howth is connected with the mainland by a low and narrow isthmus, and its insular appearance greatly enhances the picturesque effect of Dublin bay.

HÖXTER, a t. in Westphalia, on the Weser, 30 m. by rail s.s.e. of Paderborn; pop. 5,041. It is a prosperous manufacturing town, paper, linen, and cotton goods being the chief productions.

HOY, a small vessel differing little, if at all, from the sloop or smack. Its ordinary employment is in carrying goods or passengers coastwise from one place to another, and particularly in inlets, etc., where longer lighters and other vessels could maneuver only with difficulty.

HOY, one of the Orkney islands, lies s.w. from Pomona, or mainland, from which it is separated by a passage about 2 m. in width. It is 14 m. long and 6 m. broad, and its population in 1871 was 1385. Unlike most of the islands of its group, Hoy rises abruptly from the sea, with precipitous cliffs 1000 ft. in height fronting the w.; the highest eminence, Wart hill, is 1555 ft. above sea-level. It has in the s. the harbor of Long Hope, said to be the finest in the Orkneys, and defended by a fort and two martello towers. Among the curiosities of the island are the Dwarfie stone, a block of sandstone, 22 ft. long, 17 ft. broad, and 7 ft. high. One end of it has been hollowed out by iron tools, the marks of which are still visible, and a kind of apartment formed. In the s.w. of the island is the Old Man of Hoy, a pillar of rock 300 ft. in height.

HO'YA, a genus of tropical plants of the order *asclepiadaceæ*, having a 5-cleft wheel-shaped corolla and a 5-leaved spreading fleshy corona. Some of the species are common in hothouses, and from the appearance of their flowers they are called *wax-plants.*

HOYLE, EDMUND, 1672–1769; b. England; a writer on card-playing, and afterwards on games in general. His first book was published about 1744, and has been by himself and others expounded and elaborated in almost innumerable editions down to the present time. He is a great authority upon whist, and reference to him has become proverbial. To be "according to Hoyle" is to be altogether right.

HUACA. See GUACA.

HUAHEI'NĒ, the most easterly of the Society islands (q.v.).

HUALLA'GA, a river of Peru, rises on the e. side of the Andes, near lat. 11° s., at an elevation of 13,200 ft. above the sea. After a northerly course of about 500 m., during which it presents many considerable falls, it enters the Amazon.

HUAMAN'GA (now called AYACUCHO), a city of Peru, in the department of Ayacucho, stands on an affluent of the Apurimac. It was founded by Pizarro in 1539, on the route between the old and new capitals of the country, Cuzco and Lima. It has a population of about 25,000, with a cathedral and a university. Near Huamanga, in 1824, was completed the independence of Spanish America, by the decisive victory of gen. Sucré.

HUANA'CA, or GUANACO, *Auchenia huanaca* (see AUCHENIA), a species of the same genus with the llama and alpaca, of both of which some naturalists suppose it to be the wild original. It is found not only on the Andes, but throughout great part of Patagonia. It is of a reddish-brown color, the ears and hind-legs gray. It generally lives in herds of 10 to 40, and is very quick-sighted and wary; although such is the strength of its curiosity that hunters attract the herds within easy reach of their rifles by lying down on the ground and kicking their feet in the air. Like its congeners, the huanaca is extremely sure-footed on rocky ground.

HUANCAVELI'CA, a department in the interior of Peru, s.e. of the department of Lima; 10,814 sq.m.; pop. '76, 104,140. It is a mountainous, cold, and unfruitful region. There is some gold and considerable silver and copper, but the main production is quicksilver from mines discovered in 1563. Among the exports are the wools of sheep and llamas.

HUANCAVELICA, a t. of Peru, about 80 m. to the w.n.w. of Huamanga, stands, at an elevation of 11,000 ft. above the sea, on the e. declivity of the Andes. Its inhabitants, said to be about 10,000 in number, are chiefly engaged in the working of the neighboring mines of gold, silver, and quicksilver.

HUA'NUCO, a department in Peru, n. of the department of Lima; pop. '76, 77,988. The surface is rugged, the climate salubrious, and the soil fertile and well cultivated. Sugar and coffee are among the products, and there are large herds of sheep and cattle. This region is noted for ruins of ancient Indian civilization.

HUANUCO, a t. of Peru, on an affluent of the Huallaga (q.v.), which bears its own name, is situated on the e declivity of the Andes, at a distance of 180 m. to the n.n.e. of Lima. It contains 7,000 inhabitants, and is one of the most ancient places in the country.

HUARAZ', or HUARAS, a small t. of Peru, situated in a valley of the Andes, on the right bank of the river Santa, 150 m. s.e. of the seaport of Truxillo. Pop. 6,000.

HUBBARD, JOSEPH STILLMAN, 1823–63; b. Conn.; graduated at Yale, and in 1844 was assistant to Sears C. Walker, astronomer in Philadelphia high-school observatory. In 1845 he was professor of mathematics, and assigned to the naval observatory at Washington, where he won a good reputation for scientific work.

HUBBARD, WILLIAM, 1621–1704; b. England; emigrated to Massachusetts, and graduated at Harvard in 1642. He was ordained in 1658, and was nearly all his life a minister at Ipswich. In 1688 he was president of Harvard. As an author he is known by *A Narrative of the Troubles with the Indians,* in which appears the first map known to have been made in America, and a *Memoir of General Denison.* He left in manuscript a history of New England, published in 1815 by the Massachusetts historical society.

HUBBARDTON, a t. in Rutland co., Vt., 50 m. from Montpelier, mentioned in history as the scene of a sharp conflict on July 7, 1777, between the rear-guard of gen. St. Clair's army, retiring from the evacuation of fort Ticonderoga, and a considerable British force under generals Fraser and Riedesel. The Americans, under col. Warner, were driven from the town, but the British lost severely in killed and wounded.

HUBER, FRANÇOIS, a Swiss naturalist, was b. at Geneva, July 2, 1750. At an early age he lost his eyesight, and some years after this married a Mlle. Lullin, by whose assistance and that of an intelligent domestic named Burnens he made a vast variety of original and important observations on the habits of bees, which did much to correct the errors and imperfections of previous writers. Huber's first work was entitled *Lettres à Ch. Bonnet* (1792). It was reprinted in 1796, and again in 1814, under the title of *Nouvelles Observations sur les Abeilles.* In his latter years Huber derived important aid in his studies from his son Pierre (born 1777, died 1840), the author of a valuable treatise on the *Habits of Ants* and of several able memoirs relating to zoology and meteorology, which are to be found in the Mem. Soc. Genève between the years 1821 and 1830. Huber died at Lausanne, Dec. 21, 1831.

HUBER, JOHANN NEPOMUK, b. Germany, 1830; graduated at Munich university, in which institution he became professor in 1859. He was a firm opponent of Jesuitism, and had much to do with organizing and strengthening the Old Catholic movement in Germany from and after 1871. He has been a voluminous writer in favor of free discussion of theological questions and against certain Roman Catholic dogmas, notably that of papal infallibility.

HUBER, PIERRE, 1777–1840; b. Switzerland; eminent as an entomologist, devoting his attention especially to bees, ants, and butterflies. His most important work is *The History and Nature of Ants.* He afforded great assistance to his blind father, François Huber; and, in turn, gained much of his own knowledge from the deep investigations of the latter.

HUBERTUSBURG, a royal hunting-seat, not far from Leipsic, built in 1721 by Augustus III., then prince, afterwards king and elector. It was much injured during the seven years' war, and has a historic celebrity on account of the treaty by which that war was ended, called the peace of Hubertusburg. This treaty of peace was signed

here on Feb. 15, 1763, by the representatives of Prussia, Austria, and Saxony; and by it the position of Prussia was established amongst the great powers of Europe. Maria Theresa relinquished all claim to the provinces which had been acquired by Prussia; and Frederick the great restored his electorate to the king of Poland, elector of Saxony.

HUBMEYER, or HÜBMAIER, BALTHAZAR, 1480–1528; b. Germany; one of the leaders of the Anabaptist party; a professor of theology and a preacher. He was persecuted for his reformation doctrines, and fled to Moravia, where he organized an Anabaptist congregation. He was burned at the stake, March 10, 1528.

HÜBNER, RUD. JUL. BENNO, one of the most eminent painters of the modern German school, was born at Oels, in Silesia, in 1806, and first attracted attention by his picture of "Ruth and Boaz." In 1839 he settled at Dresden, where he has been a professor since 1841. His principal productions are: "Samson overthrowing the Pillars of the Temple," "The Departure of Naomi," "Christ and the Evangelists," "Job and his Friends," "The Lovers of the Canticles," "Happiness and Sleep," "Christ in the midst of the People," "The Fisherman" (from the ballad of Goethe), "The Golden Age," and "The Dispute between Luther and Dr. Eck at Leipsic." Hübner belongs to the great historic and religious school of German art, whose principal seat is Dusseldorf.

HUC, EVARISTE RÉGIS, a distinguished missionary and traveler, was b. at Toulouse, Aug. 1, 1813. He was educated in his native city, and about his 24th year he entered the missionary congregation of the Lazarist fathers, and received holy orders at Paris in the year 1839. Almost immediately after his ordination, he joined the missionary expedition of his order to China. After he had spent about three years of missionary life in the northern districts of China, the new apostolic vicariate of Mongolia was founded, and Huc, in company with a priest of the same congregation, père Gabet, and a single native Chinese convert, undertook to explore the new district, and to ascertain, for the guidance of the mission, its extent and its missionary capabilities. After a few months' study of the Tartar dialects, they set out from the missionary station, n. of the great wall, called Si-wang, towards the close of 1844; and after a journey of excessive hardship over the high tablelands of Tartary, they took up their quarters for some months in one of the lamaseries, or Tartar monasteries. Having here become familiarized in some degree with the Thibetan language, they succeeded in making their way, in Jan., 1846, to H'lassa, the capital of Thibet and the residence of the grand lama; but scarcely had they settled in that city, when an order for their immediate expulsion from the country was obtained from the lama by the Chinese resident in H'lassa. They were not permitted to choose their own route homewards, but, having been put in charge of a Chinese escort, were carried back a journey of nearly 2,000 miles to the extreme s., and arrived in Oct., 1846, at Macao, where they were subjected to a tedious trial by the Chinese tribunals. In the end, they were permitted to return to the missionary station of Si-wang, from which they had originally taken their departure. Huc's health having been completely broken down, he sailed from Macao in the beginning of Jan., 1849, and in the autumn of the same year reached his native city of Toulouse. In the following year he returned to Paris, where he published *Souvenirs d'un Voyage dans la Tartarie, le Thibet, et la Chine pendant les Années*, 1844–46 (2 vols., Paris, 1852). This was followed in 1854 by a similar record of his Chinese experience (*L'Empire Chinois*, 2 vols., 3d edit. 1857), and in 1857 by an elaborate historical work on Christianity in China (*Le Christianisme en Chine*). All these works have been translated into English and most other European languages. The strangeness of some of the incidents recorded in the book on Thibet provoked some degree of incredulity in certain quarters; but capt. Blakiston, a later traveler in the same regions, which have hitherto been almost a *terra incognita* for Europeans, bears unhesitating testimony to the fidelity of père Huc's narrative and description.

During his latter years père Huc, in order to devote himself more freely to his literary occupations, withdrew from the Lazarist congregation. His health, however, never fully recovered from the fatigues of his Thibetan expedition, and he died in Paris, March 31, 1860, at the early age of 46.

HUCKABACK, a very coarse kind of linen cloth, figured somewhat like damask; it is usually employed for common toweling.

HUCKLEBERRY, *Vaccinium*, a genus of small shrubs, of the natural order *vaccinieæ*, having a 4- to 5-toothed calyx; a 4- to 5-cleft bell-shaped or urceolate corolla, with the limb bent back; 8 or 10 stamens, with two-horned anthers; and a 4- to 5-celled many-seeded berry. The species are numerous, mostly natives of the northern parts of the world, with evergreen or deciduous, more or less ovate leaves. The COMMON HUCKLEBERRY or BILBERRY (*V. myrtillus*), called inScotl and the *blaeberry*, is very common in Britain, and in the middle and north of Europe. It is found also in Iceland and in the northern regions of North America. It delights in dry situations, but is often found in woods, and often on very elevated mountains. It varies from a few inches to almost two feet in height, and has ovate deciduous leaves and dark purple berries. A variety occurs, but rarely, with white berries. The berries are very sweet and agreeable, and

are much used for making jelly. A kind of spirituous liquor is also made from them in Germany. The BOG HUCKLEBERRY, or GREAT BILBERRY (*V. uliginosum*), is common in the northern parts of Britain and in the n. of Europe and Asia. It is said to cover extensive tracts in Greenland. It grows in marshy situations, and is a taller plant than the common huckleberry. It has deciduous, obovate, entire leaves, and a fruit larger than the common huckleberry and inferior to it in flavor. The fruit is said to cause giddiness when eaten in large quantity. An intoxicating liquor is made from it in Sweden and in Siberia. The only other British species is the RED HUCKLEBERRY (*V. vitis idæa*), which is often called *cranberry*, because of the similarity of its acid fruit to the cranberry (q.v.). It is a native of the n. of Europe, Asia, and America, and is plentiful in some parts of Britain. Its fruit is much esteemed for preserves, and is used in the same way as the cranberry. Large quantities are sent to the s. of Europe from the shores of the gulf of Bothnia. The plant is a pretty dwarf shrub, with obovate evergreen leaves and racemes of flowers. *V. buxifolium* is generally regarded as a mere American variety of it.—Many species of *vaccinium* are in occasional cultivation as ornamental shrubs, and the fruit of most of them is agreeable, although in general it wants acidity. Their more general cultivation has perhaps been prevented by the prevalent notion that they require a peat soil, but they succeed on other soils also. Most of them are North American, and the fruit of some of them is often brought to market in North American towns. The BLACK HUCKLEBERRY (*V. angustifolium* or *gaylussacia angustifolia*) is a shrub about 2 ft. high, much branched and erect, with deciduous oval leaves. The berries are of a shining black color, and sweet. It is widely diffused from Canada to Georgia. The BLUE TANGLEBERRY (*V. frondosum* or *gaylussacia frondosa*) is a rather larger and more spreading shrub, which grows near lakes and springs. The fruit is slightly acid. The BEAN HUCKLEBERRY (*V. ursinum* or *gaylussacia ursina*) is found on the mountains of North Carolina; the BOX-LEAVED HUCKLEBERRY (*V. brachycerum* or *gaylussacia brachycera*) in Pennsylvania and Virginia. There are other North American species, as *V. Canadense*, *V. humifusum*, and *V. parvifolium*, humble evergreen shrubs. Several species are natives of Mexico. *V. arctostaphylos* is a native of the coast of the Black sea; and *V. padifolium* is a native of the Caucasus and of Madeira, on the loftiest parts of which island it forms impenetrable thickets, growing from 6 to 10 ft. high.

HUDDERSFIELD, a parliamentary borough and important manufacturing and market town of England, in the West Riding of Yorkshire, is situated in the midst of a fertile district, on an acclivity rising from the left bank of the Colne, 16 m. s.w. of Leeds and about 25 m. n.e. of Manchester. It is remarkably regular, is well built and drained, and very healthy. Upon the Holme and the Colne, which unite in the town, numerous mills have been erected for the manufacture of woolen fabrics, and for fulling and washing the goods manufactured. Huddersfield stands in the center of a district rich in coal, and its natural advantages are enhanced through its direct connection with the principal seats of manufacture in the n. of England, by means of the London and North-western, Lancashire and Yorkshire, and Manchester, Sheffield, and Lincolnshire railways. Among its churches, several are noteworthy in an architectural view. It has a proprietary college, now in connection with the London university; a collegiate school, and many other educational institutions; a circular cloth-hall, 2,640 ft. in circumference, in which a market is held for woolen goods every Tuesday, and for general produce every Saturday; an infirmary; and in the vicinity of the Lockwood Spa baths, where the water is strongly sulphureous. Huddersfield is the chief seat in the n. of England of what is called the "fancy trade," comprising shawls, waistcoatings, flushings, etc., of the most elegant patterns and the finest fabric; it also carries on extensive manufactures of narrow and broad woolen fabrics, cassimeres, serges, and cords. It is connected by canals with the Mersey and the Humber. The parliamentary borough sends one member to the house of commons. Pop. '71, 74,358.

HUDSON, a river in New York, United States, and one of the most beautiful and important in America. It rises in the Adirondack mountains, 4,000 ft. above the level of the sea, and its head-streams are the outlets of many mountain lakes in the north-eastern portion of the state. At Glens Falls it has a fall of 50 ft., and soon after, taking a southerly course, runs nearly in a straight line to its mouth at New York city. At Troy, 151 m. from its mouth, it is affected by the tide and becomes a broad deep river, having a width of from 300 to 700 yards, and deep enough for the largest river steamboats and for ships to Hudson, 116 miles. At Newburg, 61 m. from New York, the river enters the highlands, which rise abruptly from the water to the height of 1200 to 1600 feet. Here the scenery is of great beauty and grandeur, and is admired by all travelers. Several of the heights are crowned with the ruins of fortifications built to prevent the passage of British ships in the war of independence. Here was the scene of Arnold's treason and the sad fate of maj. André. Emerging from the highlands, the river widens into a broad expanse called the Tappan Zee. Below, on the w. bank, on the New Jersey shore, rises an almost straight and perpendicular wall of trap-rock, from the river's brink to a height of 300 to 500 ft., called the palisades, extending 15 m. to the upper portion of the city of New York. The river is here from 1 to 2 m. wide, and here it falls into New York bay.

Its whole length is about 300 m., and its principal tributaries are the Hoosic, Mohawk, Walkill, and Croton. The steamboats which ply on the Hudson are among the finest and fastest in the world. Some are more than 400 ft. long, are fitted up with great luxury, and attain a speed of 23 to 24 m. an hour. The Hudson River railway runs along the margin of the river on the e. bank to Albany. By this river, and the Erie canal, and several railways New York is connected with the great lakes and the west. The river is named from the English navigator who discovered it, 1609. The first successful experiment in steamboat navigation was made on this river by Robert Fulton in 1807.

HUDSON, called also the NORTH RIVER, "the Rhine of America," one of the most important and beautiful streams of the United States. It rises in the Adirondack mountain region, and runs almost due s. from the neighborhood of lake George to New York bay, a course of nearly 300 miles. Down as far as Troy it is broken by falls and rapids, but thenceforth to the sea it is a tidal stream varying from a quarter of a mile to a mile in width, and with the exception of the shallows a short distance below Albany, in every part navigable for steamboats and light-draught sailing-vessels. It has been improved on the shallow part, and there is now no obstruction as far up as Troy, 151 m. above New York. The scenery of this river is especially fine. Sailing n. from New York city one passes on the e. side the heights of Fort Washington and the village of Inwood on the upper part of Manhattan island; Spuyten Duyvel creek, connecting with the Harlem river and so separating Manhattan from the mainland; then the village of Riverdale, near which are the buildings of Mt. St. Vincent, the mother-house of the sisters of charity, the central building being a granite castle originally erected for his own dwelling by Edwin Forrest, the actor; the suburban city of Yonkers, one of the most beautiful of towns both naturally and in its elegant residences; and the villages of Hastings and Dobb's Ferry. On the w. side the palisades extend, an unbroken wall of rock from 250 to 600 ft. high, from Hoboken, opposite New York, to Piermont, nearly opposite Dobb's Ferry. At this point, 20 m. from New York, the river spreads out into the Tappan Zee, 3½ m. wide and 10 m. long. On the e. shore are Irvington, just n. of which is Sunnyside, the home of Washington Irving; Tarrytown, with Sleepy Hollow close by; and Sing Sing, a beautiful village, with the state penitentiary conspicuous from the river. All along this part of the river-bank are palatial residences with park-like grounds. On the w. side the palisades fall back into sloping hills some miles distant from the river, and give place for the villages of Piermont and Nyack and their adjoining farms. Above Nyack the mountains again come out to the river, and on the e. side Croton point, projecting from near the village of Cortland, bounds Tappan Zee on the n. and separates it from Haverstraw bay, named after the village which is the great brick manufactory of the country. Haverstraw bay in turn ends northward with the narrow pass between Stony Point on the w. and Verplanck's Point on the east. The highlands now loom up boldly in front, and after we pass Peekskill, on the right, the river narrows again and winds between Anthony's Nose on the e. and Dunderberg and forts Clinton and Montgomery on the west. Bending our course to the n.e. and then to the n.w., we pass around West Point, the picturesque seat of the U. S. military academy, then by Cornwall, also on the w. bank, and the river widening into the bay named from Newburg, a beautiful city rising from the w. bank, while 15 m. above, on the e. bank, is the city of Poughkeepsie. The course of the river now is more directly n. and s., and we pass on the e. the villages of Rhinebeck, Barrytown, and Tivoli, and on the w. Rondout and Kingston, since 1872 united in one city, the villages of Saugerties and Malden, and Catskill, with the mountains of that name towering just inland. A little farther up, on the e. side, is the city of Hudson, and above Hudson the villages of Stuyvesant, Castleton, and Greenbush, and on the w. side Athens, Coxsackie, New Baltimore, Coeymans, Overslaugh, and the city of Albany. Here the river is crossed by the first bridge, that of the New York Central railroad. A few miles above, the Mohawk river, the largest branch, enters from the w., and close by it the Erie canal, while on the e. side stands the city of Troy. The upper river flows through a picturesque country, and along its banks are a number of handsome towns and villages, among the most important being Lansingburg, Waterford, Fort Edward, and Glens Falls. The Hudson river was seen by Verrazano in 1525, but was not explored until the arrival of Henry Hudson in Sept., 1609. He went up nearly to the present site of Albany, and named the stream "the river of the mountains." It was afterwards called Mauritius, after prince Maurice of Nassau, and finally the Hudson or, geographically, the North river, the Delaware being the South river. Its Indian name was Shatemuc. It was on the Hudson river that Robert Fulton made his first successful experiments in steam navigation.

HUDSON, a co. in n.e. New Jersey, between the Hudson and Passaic rivers, crossed by the New York, Lake Erie, and Western, the Morris and Essex, and the New Jersey Northern railroad; 75 sq.m.; pop. '70, 129,027; in '80, 187,950. The surface is generally rough, the eastern limit being bounded by the palisades, on the Hudson river, and the soil is tolerably fertile. The chief productions are garden vegetables for city market. Co. seat, Jersey City.

HUDSON, a city of New York, U. S., on the e. bank of the Hudson river, 116 m. n. of New York and 29 m. s. of Albany. It is a beautifully situated and well-built city, is a port of entry, and formerly had a large amount of shipping engaged in foreign trade and the whale-fisheries. It is now chiefly engaged in the manufacture of iron and in the export of agricultural staples. It has a fine court-house, city-hall, eleven churches, public library, orphan asylum, and five newspaper offices. Pop. '70, 8,615.

HUDSON (*ante*), a city in Columbia co., N. Y., on the Hudson river and the New York Central railroad, 28 m. s. of Albany, at the terminus of a railroad to Boston; pop. '75, 8,615. It is one of the oldest cities in the state, having been incorporated in 1785. Among its public buildings are a court-house, city-hall, more than a dozen churches, an academy, a public library, and a number of manufactories, furnaces, and foundries.

HUDSON, a village in Summit co., Ohio, at the junction of the Cleveland and Pittsburg with the Cleveland, Columbus, and Mt. Vernon railroads, 25 m. s.e. of Cleveland; pop. 1800. It is the seat of Western Reserve college, organized in 1827.

HUDSON, FREDERIC, 1819–75; b. Mass.; for more than 30 years connected with *New York Herald* as principal or managing editor under Mr. Bennett. Hudson wrote an elaborate *History of American Journalism*, a careful and instructive compilation of the rise and progress of the press in the United States. He met his death at Concord, Mass., by being run over by a train of cars while driving.

HUDSON, GEORGE, English railway director and speculator, was b. in 1800, and apprenticed to a linen-draper in the city of York, where he subsequently carried on business for himself. He took an early share in railway speculation, and was appointed chairman of the North Midland company. His plans of management were carried out, schemes of railway annexation and extension were undertaken, embarrassed lines were relieved, and rivals were subdued. He was elevated into the dictatorship of railway speculation; everything he touched turned into gold; and Hudson was everywhere known as "the railway king." The shares of the lines with which he consented to become connected went up, and he was said to have made £100,000 in one day. He bought large estates; was three times elected lord-mayor of York; was sent to parliament by the electors of Sunderland; and found his acquaintance courted by persons of the highest rank. When the railway mania was at its height a statue to Hudson was proposed, and names were put down for £25,000; but before the money could be collected the popularity of the "railway king" was on the wane. His connection with the Eastern Counties railway led to some exposures. The accounts had been "cooked;" matters had been "made pleasant;" and dividends had been paid out of capital. Suspicions were excited in regard to his direction of other companies, shares fell, the bubble burst, the railway monarch was deposed, and encountered nothing but invective from quarters which had pursued him with adulation. Every board-room was closed against him, and his suddenly acquired gains were almost swept away. The constituency of Sunderland, however, continued to elect him as their representative until March, 1859. He afterwards resided abroad, in comparatively narrow circumstances, and died Dec. 14, 1871.

HUDSON, HENRY, a distinguished navigator. His early history is unknown. He undertook his first voyage for the discovery of a n.e. passage in 1607, in a small vessel with ten sailors, but failed in this attempt. In his second voyage, in 1608, he reached Nova Zembla. He undertook a third voyage in 1609 from Amsterdam, at the expense of the Dutch East India company. Giving up all hope of finding a n.e. passage, he sailed for Davis's strait, but came upon the American continent about 44° n. lat., and steering southwards, discovered the mouth of the river which now bears his name. He sailed upon his last voyage in April, 1610, with 23 sailors, and reached Greenland in June. Steering westward, he discovered the strait now known as Hudson's strait, and passed through it and entered the great bay which has received the name of Hudson's bay. Although very insufficiently supplied with provisions, he adopted the resolution of wintering in these desolate regions in order to prosecute his discoveries further in the following spring. He proceeded to carry this design into execution, but his provisions became so much exhausted that he was under the necessity of returning. An incautious utterance of his opinion, that in the destitute condition to which he was reduced he would be obliged to leave some of his people behind, led to his death. The sailors mutinied and placed him, with his son and some others who adhered to him, in a small boat, at the mercy of the waves and of the savages. His fate was revealed by one of the conspirators. An expedition was sent from England in quest of him, but no trace of him or of his companions in misfortune was ever discovered.

HUDSON, HENRY NORMAN, b. Vt., 1814; graduated at Middlebury college, and was a teacher in Kentucky and Alabama. He devoted much of his time to the study of Shakespeare, and in 1848 published two volumes of lectures on the plays of the great author. About 1844 he joined the Protestant Episcopal church, and in 1849 took priestly orders in New York city. From 1850 to 1857 he issued an elaborate Shakespearean commentary in 11 vols., and in 1860–61 lectured on the same themes. In the war of the rebellion he was chaplain in the union army, and has since been engaged in editorial work. Besides his works on Shakespeare he has published *A Chaplain's Campaign with General Butler*, *Sermons*, etc.

HUDSON, Sir JAMES, G.C.B., diplomatist, is the son of a Yorkshire gentleman, and was b. in London in 1810. He was educated at Rugby and Westminster, and subsequently studied at Paris and Rome. He was made private secretary to William IV.; and after the king's death entered the diplomatic service, and became secretary of legation at Washington in 1838, at the Hague in 1843, and at Rio de Janeiro in 1845. In 1850 he was appointed minister at Rio, but was transferred to Florence in 1851, and to Turin Jan., 1852. His counsels exercised great influence over the Sardinian government; and the conclusion of a commercial treaty between that country and England, the accession of Sardinia to the treaty of alliance between England and France against Russia, and the dispatch of a Sardinian army to the Crimea, were services which procured for him the dignity of K.C.B. The long train of stirring events that resulted in the united and independent kingdom of Italy demanded the watchful vigilance, and sometimes the active interference, of the British minister at the court of Turin. Hudson never forgot that he was the minister and representative of a constitutional government which sympathized with the aspirations of the Italians for national independence, and which had therefore the privilege to warn and counsel as well as to animate. He retired from Turin in 1863. His diplomatic course has not escaped the animadversion of the partisans of things as they were, but it has commanded the approbation of the vast majority of his countrymen.

HUDSON'S BAY, a spacious gulf in the n.e. section of the American continent, may be regarded as an arm at once of the Arctic sea and of the Atlantic ocean. With the Atlantic ocean it communicates by means of a strait, which, besides being solidly bridged for about ten months of the year, is beset, even during its brief period of navigation, by detached floes and bergs of ice. The eastern portion of this outlet is broken up into two branches, offsets of Davis's strait, the more northerly bearing the name of Frobisher, and the more southerly that of Hudson. It is fully 400 m. long, and averages at least 100 m. in width. With the Arctic sea, again, Hudson's bay is connected by channels, which, notwithstanding the comparative lowness of their latitude, have proved far less practicable than the Arctic sea itself, never having been navigated throughout; but it is only within these 25 years that this hopeless result has been definitively accepted by the world.

Hudson's bay, taken in its narrowest sense, extends in n. lat. from 51° to 62½°, and in w. long. from 76½° to 95°. When compared with the corresponding regions on the eastern side of the Atlantic, the shores of Hudson's bay possess a singularly inhospitable climate. At York Factory, lying nearly in the latitude of Aberdeen, the finest weather of summer is liable to a wintry temperature through a mere change of wind; and the most southerly extremity of the gulf is beset for months by snow at the very season when the Faroe islands, stretching as far n. as the parallel of its opposite end, yield available pasture to sheep and cattle.

Though Hudson's bay is not particularly remarkable for the extent of its drainage, yet towards the s. and w. its basin meets at once the waters of the St. Lawrence, the Mississippi, the Columbia, and the Mackenzie. Its largest feeder, the Nelson, fills perhaps a full half of the area, touching the Rocky mountains on the w., embracing Rainy lake on the e., and considerably overlapping the international boundary on the south.

HUDSON'S BAY COMPANY, a corporation erected in 1670 by Charles II., primarily consisted of prince Rupert, the king's cousin, and certain specified associates. It was invested with the absolute proprietorship, subordinate sovereignty, and exclusive traffic of an undefined territory, which, under the name of Rupert's Land, comprised all the regions discovered, or to be discovered, within the entrance of Hudson's strait. Rupert's Land was decidedly the most extensive of the dependencies of England, being held to embrace all the lands that poured water into Hudson's bay or Hudson's strait. For more than a century, however, the grantees confined themselves to the coast. About the period of the formation of the American republic their advance into the interior was accelerated, if not occasioned, by the more mature development of an ancient rivalry. From about the middle of the 17th c.—an epoch antecedent to the charter—New France, besides stretching, in name, to the arctic circle, had, in reality, advanced to the shores of Hudson's bay; and this position of affairs was virtually recognized by that provision of the letters-patent which exempted from their operation any actual possessions of any Christian prince or state. Though the claims of France, after being confirmed in 1697 by the treaty of Ryswick, were at last abandoned in 1713 by the treaty of Utrecht, yet, in point of fact, adventurers from the great lakes, while Canada was still French, had penetrated, in quest of peltry, far up the Saskatchawan towards the Rocky mountains. Such overland enterprises—interrupted, for a few years, by the conquest and cession of 1759-63—soon came to be prosecuted, with more systematic energy, under English auspices, till, in 1783, they led to the formation of the North-west company of Montreal. After an age of stubborn competition, the Hudson's bay company coalesced, in 1821, with its formidable opponent.

But the two members of the new partnership had already almost doubled the original field of contention. The older association had, about 1770, traversed the basin of the Coppermine; and, fully 20 years later, the younger one had descended the Mackenzie to the Arctic sea, and had, through the barrier of the Rocky mountains, reached

the Pacific ocean. Even in general equity, a body which now represented all the discoverers had a peculiar right to the discoveries themselves; but beyond general equity, a secondary provision of the letters-patent of Charles II. had regarded such discoveries, at least for the purposes of trade, as accretions to the primary grant. Accordingly, when, in 1821, parliament, in view of the intolerable evils of competition, empowered the crown to issue licenses for the "Indian territories"—expressly declared to be all the wildernesses of British North America to the w. of Rupert's Land—the government exercised this statutory authority in favor of the Hudson's bay company as recast and extended by the coalition. So far as commerce was concerned, there was now no practical difference between Rupert's Land and the Indian territories, excepting that the charter of the former was perpetual, and the license of the latter was to be for 20 years at a time; and thus the newly modified association virtually ruled the western world, through 75° of long., from Davis's strait to Mt. St. Elias, and, through 28° of lat., from the mouth of the Mackenzie to the borders of California.

About 20 years after the coalition, Oregon from the borders of California to the parallel of 49° n., which had always been open to Americans by international arrangement, was given up to the United States by the same treaty which sacrificed sections of Canada and New Brunswick; in 1859 the rest of the tramontane tract was brought within the pale of civilization as the national colonies of Vancouver's island and British Columbia; and lastly, as the second term of the license was, in 1859, also permitted to expire without renewal, the remainder of the "Indian territories" was then potentially thrown back into the condition from which the statute of 1821 had seen fit to rescue it.—In all these cases, excepting, of course, the case of Oregon, the Hudson's bay company would appear to have lost rather formal privilege than actual influence, retaining, if not a legal monopoly as of old, at least a commercial supremacy on a wider basis.

Though the withholding of the license neither affected nor professed to affect Rupert's Land, yet between it and the remaining portion of the Indian territories the difference, so far as Hudson's bay company was concerned, was little more than nominal; and in 1869 the company made a formal cession to the British government of whatever territorial claims remained, receiving an indemnity of £300,000 from the Dominion of Canada, to which the whole territories were forthwith annexed. It was, however, stipulated that the company should retain all its forts, with 10 acres of ground at each, and one-twentieth of all the land from the Red river to the Rocky mountains, besides blocks to which it made special claim. At this reservation the Canadians rather grumble, as the land is meanwhile kept unimproved, though it gains indefinitely in value by the improvements made around it by the labor of others. Since the transfer to Canada, the government has entered into treaties with the Indians, by which the latter have surrendered their right to the land on certain conditions, particularly the setting apart of a certain amount of land for their exclusive use, the annual payment of $5 to each individual, and certain presents of clothing, food, utensils, and cattle. The territory has been organized in three divisions: 1. Manitoba (see RED RIVER SETTLEMENT); 2. Keewatin, embracing that portion of the Hudson's bay territory e. and n. of Manitoba; and 3. The North-west territory, including the region between these and British Columbia. During its monopoly, the company kept strict faith with the Indians (fulfilling every bargain, though it possibly bought for a few trinkets furs worth pounds), and gained their confidence by kindness and sympathy. Its great influence for good over the half-breeds also is not to be forgotten. Over a territory with ports further apart than London and Mecca, Paris and Samarcand, the organization of the company was perfect, and its operations seemed to go as if by clock-work.

Formerly there were but few immigrants into the Hudson's bay territory. Most of the settlers were either retired servants of the company or their offspring. The few immigrants in pursuit of agricultural enterprise were sent to Rupert's Land at the expense of others, such as the earl of Selkirk (see RED RIVER SETTLEMENT), or the company itself. But since the annexation of the territory to Canada, and the formation of the province of Manitoba, there has been an influx of immigrants into the land; and this influx will become broader and deeper, for a finer grain-growing country than that to the n.w. of lake Superior does not lie under the sun. The loss of territorial control has not in the least affected the Hudson's bay company as a trading community. Its organization is still complete. Its shares or parts are indeed now quoted on the stock exchanges, an arrangement quite recently come to, but this only means that a wider public may enjoy its benefits than was formerly allowed under a very close corporation. It has still its offices, its outlets for young energy to risk itself "over flood and fell;" but, best of all, very large dividends. As a single part, between one year and another, ranges from about £300 to about £500, the total revenue may easily be found to vary from about £63,750 to about £106,250—averaging perhaps about £80,000, so as to yield about £48,000 to the proprietors and about £32,000 to the wintering partners. This income arises almost entirely from fur; for other articles, such as tallow, oil, feathers, fish, timber, etc., have never been of much account. The working organization of the company is as follows: A young man commences with the rank of apprentice-clerk, or apprentice-postmaster. These postmasters are those in charge of the various posts which have been from time to time erected around the central one, at distances varying from about 200 to 500 miles. Such settlements are supplied with goods in accordance

with the amount of trade likely to be done. In the fall of the year the Indians collect and get what is called "debt" proportionately with their known qualifications as hunters. They then depart to their hunting-grounds, and are visited at various periods during the winter by the servants of the company (generally half-breeds), who bring back with them any peltries (or furs) that may be on hand. These, in turn, are made into packs and transmitted, in spring, by canoes to the central post, and from thence are transmitted either to England or Canada, as the case may be. These skins are given to the traders in repayment of the "debt" paid to the Indians.

For further particulars, see Fitzgerald's *Examination of the Charter and Proceedings of the Hudson's Bay Company* and Montgomery Martin's *Hudson's Bay Company's Territories and Vancouver's Island*, both published in 1849—perhaps the leading works on opposite sides of a much-vexed controversy.

HUDSON'S STRAIT. See HUDSON'S BAY, *ante*.

HUÉ, the capital of Cochin China, or, more properly speaking, Anam, in the gulf of Tonquin, in the prefecture of Thua Thuan, 16° 30′ n. lat., 107° 12′ e. long., 10 m. from the mouth of the Hué river. It is built almost in the European style. Under the reign of king Cia-lung (1801–20) it was strongly fortified by French officers, to whom, with a French bishop, that monarch was indebted for his throne. It is accessible only to vessels of the smallest class, owing to the shallowness of the small river on which it is situated. Pop. variously estimated at from 30,000 to 100,000.

HUE AND CRY, a phrase, derived from the old process of pursuit with horn and voice, used in English law to describe the pursuit of felons. Whoever arrested the person pursued was so far protected that he required no warrant to justify the arrest; and even if the party turned out to be no felon, no action could be brought if the arrest was *bona fide*. But it was not only a ground of action, but an offense subject to fine and imprisonment, to maliciously and wantonly raise the hue and cry against a person. It was the duty of all persons to join in a hue and cry, and if a person who had been robbed, or knew of a robbery, failed to raise the hue and cry, he was liable to fine or imprisonment, or, according to some authors, to indictment. Hue and cry is now abolished.

HUELVA, a province in s.w. Spain, bordering on Portugal and the ocean; 4,118 sq.m.; pop. '70, 196,469. It is a mountainous region, thickly peopled but not much cultivated. There are mines of iron, copper, lead, and coal, with several springs and salt works. The capital is Huelva.

HUEL'VA, a maritime t. in the s. of Spain, capital of the province of the same name, which was formed out of a portion of the ancient kingdom of Seville (q.v.), is situated at the confluence of the Odiel and the Tinto, 63 m. w.s.w. of Seville, with which it is joined by railway. Its trade with Portugal and Cadiz is considerable, and it carries on an extensive tunny-fishery; but its chief commercial importance is derived from the copper-mines, the product of which in 1872 amounted to £651,559. The remains of a Roman aqueduct in the vicinity are now fast disappearing. Pop. 8,423.

HUERFANO, a co. in s. Colorado, traversed by the Denver and Rio Grande railroad; 1500 sq.m.; pop. '70, 2,250. The surface is rough and in some parts mountainous, with a good share of pasture-land. Stock-raising is the main employment. Co. seat, Walsenburg.

HUERTA, VICENTE GARCIA DE LA, a Spanish poet and critic of the 18th c., was b. in 1729 at Zafra, in Estremadura, but spent the greater part of his life in Madrid, where he held the office of principal librarian of the royal library, and where he died March 12, 1797. He early distinguished himself by his poetic talent. His tragedy of *Raquel*, founded upon the story of the love of king Alfonso VIII. for the fair Jewess Rachel and its tragical catastrophe, was received with great enthusiasm when first produced in 1778, and is to this day esteemed as one of the very best of modern Spanish tragedies. Huerta was a most zealous but not always a wise or skillful defender of the ancient Spanish national taste against the Gallicism which then prevailed. As a lyric and dramatic poet he shows great command of language and versification. His poems were published in two volumes (*Obras Poeticas*, Madrid, 1778–79). Huerta edited the *Teatro Español* (17 vols., Madrid, 1785–86), a collection of the best works of the older Spanish dramatists.

HUES'CA (the *Osca* of the Romans), a very old and picturesque t. of Spain, capital of the modern province of the same name (see ARAGON), is surrounded by old walls once surmounted by 99 towers, two of which only remain, and is situated in the midst of a plain covered with vineyards, on the right bank of the Isuela, 50 m. n.e. of Saragossa. Among its chief buildings are the cathedral, built in 1400, a beautiful Gothic edifice; the university, founded in 1354 by Pedro IV.; and the picturesque college of Santiago. It was once famous as a seat of learning. Tanning and manufactures of linens are here carried on to some extent. Pop. 10,068.

HUES'CAR, a small t. of Spain, in the province of Granada, is situated 75 m. n.e. of the city of that name, and is said to contain a pop. of about 6,000, who are chiefly employed in the manufacture of linen and woolen goods.

HUET, FRANÇOIS, 1814–69; b. France; a professor in the university of Ghent, and one of the forerunners of the Old Catholic movement. He was opposed to the absolutism of the pope, and undertook to establish Neocatholicism, which was very much like the system afterwards advocated by Döllinger and Hyacinthe. He published *Cartesianism, or True Renovation of Science; The Social Regeneration of Christianity; Essays on Catholic Reform*, etc.

HUET, PETER DANIEL, was b. at Caen, Feb. 8, 1630. His father had been converted from Calvinism, but died while Huet was still very young. The latter was educated in the Jesuit school of Caen, and was early distinguished by his extraordinary progress in almost every department of learning. He was a zealous pupil of Descartes and of Bochart—the latter of whom he accompanied on his visit to Stockholm in 1652, when he discovered and transcribed the MS. of Origen, which, subsequently, was the basis of his celebrated edition of that father. On his return to Caen, he gave himself up entirely to study; and as a preliminary to his translation of the text of Origen, he published, in 1664, his well-known essay *De Interpretatione;* but it was only at the end of 15 years' study that he published his edition of Origen's *Commentaria in Sac. Scripturam*, 2 vols. fol. (Rouen, 1668), with a most learned introduction, entitled *Origeniana*, which has since been reprinted in the great Benedictine edition of that father. In 1670 Huet received the degree of doctor of law; and soon after he was summoned to Paris to take part with Bossuet in the education of the dauphin. In 1679 he published his *Demonstratio Evangelica*. He had an active part, moreover, in the Delphin edition of the classics. In 1676 he entered into holy orders; and in 1678 was named abbot of the Cistercian abbey of Aunay, from which place is named his well-known work, *Quæstiones Alnetanæ de Concordia Rationis et Fidei* (1690). About the same time, also, he published a work *On the Site of the Terrestrial Paradise*, another *On the Voyages of Solomon*, which were followed later by his equally celebrated work in classical geography, *History of the Commerce and Navigation of the Ancients*. In 1685 he was named bishop of Soissons, a dignity, however, on which he never entered, being transferred to the see of Avranches in 1692. He was as zealous in the discharge of his episcopal duties as he had been in his devotion to literature; but his health having given way, he obtained permission to resign his see in 1699, and retired to the abbey of Fontenay, near Caen; but in 1701 he took up his residence in the Jesuits' house in Paris, and published in 1718 his autobiographical memoirs—a model of pure Latinity as well as a most interesting record of the history of his time. Huet died in 1721. His works were published in a collected form in 1712, and a volume of *Huetiana* appeared in 1722.

HUFELAND, CHRISTOPHER WILLIAM, one of the most distinguished physicians of modern times, was b. on Aug. 12, 1762, at Langensalza, in Thuringia. After having completed a general and medical education at the best schools in Germany, he was appointed physician in ordinary at the court of Weimar, where his father and his grandfather had previously filled the same office. Retaining this honorary title, he removed in 1793 to Jena, to be ordinary professor of medicine there; and after refusing a number of invitations to other places, he went from Jena to Berlin in 1798 with a number of very honorable professional appointments. On the foundation of the university of Berlin in 1809, he became one of its professors. He died Aug. 25, 1836. He had a very high reputation for skill and tenderness as a physician, and he was equally esteemed for his intellectual abilities and his noble and benevolent character. A number of benevolent societies and institutions owed their existence to him, and many others found in him a zealous and liberal supporter. His published works are numerous, chiefly on medical and physiological subjects. His *Makrobiotik*, or the Art of Prolonging Life, originally published in 1796, was translated into almost all the languages of Europe. Translations exist in Servian, Hungarian, and Hebrew. Amongst his most important works are one on scrofula, *Ueber die Ursachen, Erkenntniss, und Heilung der Skrofelkrankheit* (Berlin, 1795), which has gone through several editions and been translated into several languages; an advice to mothers on the Physical Treatment of Children, published in 1799; and his *Enchiridion Medicum*, or Introduction to the Practice of Medicine, published in 1836.

HUG, JOHN LEONHARD, was b. at Constance, June 1, 1765, studied at Freiburg, and in 1789 entered into priest's orders. In 1791 he was appointed professor of oriental languages and of the Old Testament, to which was added, in 1792, the professorship of the New Testament also. These united professorships Hug continued to hold uninterruptedly for upwards of half a century, with the exception of some brief occasional visits to the great libraries of Munich, Vienna, Paris, Milan, Rome, and Naples. The most important fruit of his biblical researches was his *Introduction to the New Testament*, which appeared in 1808, in 2 vols., and which, besides several German editions, has been translated into most of the European languages. His great eminence as a biblical scholar led to his being called on to take part in the arrangement of the newly organized studies of most of the German universities—as at Breslau, in 1811; at Bonn, in 1816; at Tübingen, in 1817; and again at Bonn, 1818 and 1831. He died Mar. 11, 1846. His works, which are indifferently in Latin and German, are chiefly in the department of biblical criticism; as, *On the Age of the Vatican MS.* (1810); *On the Canticle of Canticles* (1813, and again 1818); *On the Indissolubility of Marriage* (1816); *On the Alexandrian*

Version (1818); *Re-examination of Strauss's Life of Jesus*, 2 vols. (1835); but there are also some on subjects of classical criticism, especially an interesting work on the ancient mythologies (1812). See Maier's *Gedächtnissrede auf Hug* (1847).

HUGER, BENJAMIN, b. S. C., 1805; a graduate of West Point, serving in the Mexican war, and present at the surrender of Mexico. He was brevetted maj., lieut.col., and col. for gallant conduct. In 1861 he went with the rebellion and was made a maj.gen. in the confederate army. At the close of the war he settled in Virginia and engaged in farming.

HUGER, FRANCIS KINLOCK, 1764–1855; b. S. C.; the son of Isaac Huger, a revolutionary officer. He studied medicine under Dr. John Hunter and in Philadelphia, but is best known for joining in an attempt to take the marquis de Lafayette from his prison in Olmutz. He was arrested, and for eight months kept a prisoner. In 1798 he returned to America, and served in the second war with England in 1812. He was also in the South Carolina legislature.

HUGER, ISAAC, 1742–97; b. S. C.; one of five brothers who took the side of the colonies in the revolution. He was engaged in a number of battles and skirmishes, among which were the sieges of Savannah and of Charleston and the battle of Guilford court-house.

HUGGINS, WILLIAM, LL.D, b. London, 1824; an astronomer. In 1855 he built an observatory at his residence, in which he mounted a telescope of 8 in. aperture, and made some careful drawings of Mars, Jupiter, and Saturn. His attention was first engaged in observations on double stars, but afterwards he devoted himself to the spectrum analysis and the study of nebulæ and comets. With Dr. Miller he compared the spectra of about fifty stars directly in the instrument with the spectra of several terrestrial elements. They concluded that the stars are hot bodies, similarly constituted to our sun, and that they contain many of the substances found on the earth. One of the most remarkable of Mr. Huggins's subsequent discoveries was that of the nature of some of the nebulæ. He found that some of the bodies gave a spectrum of a few bright lines only, which showed that the light had emanated from heated matter in the state of gas; and further that one of the principal constituents of the gaseous nebulæ is hydrogen. He concluded, therefore, that the nebulæ are not clusters of stars too distant to be separately distinguished. He has since continued his prismatic researches by a re-examination of the nebulæ by a more powerful spectroscope, by which his former results have been confirmed. He has also examined the spectra of four comets, and has found that the greater part of the light of these objects is different from solar light. The spectrum of Winnecke's comet he found to be identical with the spectrum of carbon. His observations of the bright comet of the autumn of 1874 confirm his earlier ones, and show that carbon, probably with hydrogen, forms one of the constituents of cometary matter. Mr. Huggins has also shown that the proper motion of the stars in the line of sight can be determined from any small shift of position which the lines of their spectra may have suffered, and that Sirius is moving from the earth with a velocity of 27 m. per second. Of 30 stars examined, subsequently 19 were found to be receding and 11 approaching. He has made observations of the spectra of the solar prominences, and devised the method by which the forms of these objects may be seen. He has also succeeded in detecting the heat received at the earth from some of the fixed stars. On the occasion of the meeting of the British association at Edinburgh, in 1871, he was created honorary LL.D. of that university. He was president of the royal astronomical society of Great Britain, 1876–78.

HUGH CAPET. See CAPETIAN DYNASTY, *ante*.

HUGHES, BALL, 1804–68; b. England; became a sculptor, studying seven years with E. H. Bailey, and becoming a successful competitor for the prizes of the royal academy. In 1829 he came to New York and made a fine bust of Alexander Hamilton, which was placed in the old Merchants' exchange, but was destroyed in the great fire of 1835. There is a work of his now in Trinity church, an alto-rilievo of bishop Hobart, and there are some of his works in Boston. He also made the bronze statue of Nathaniel Bowditch, in Mt. Auburn cemetery, near Boston.

HUGHES, JOHN, D.D., 1797–1864; b. Ireland; came to the United States at the age of 20, and was educated at Mount St. Mary's (Roman Catholic) college, Emmettsburg, Md. In 1825 he became a priest, and had pastoral charge in Philadelphia, where he established *The Catholic Herald*. In 1842 he became bishop of New York. This was about the time of the "Native American" political excitement, and he became an ardent opponent of that movement, especially so far as it meant to prohibit the appropriation of public money to the schools of the Roman Catholic church. In 1850 he was made archbishop, and his personal power and character had much to do with the growth of the church in the United States. He was the founder of St. John's college, and Aug. 5, 1855, he laid the corner-stone of St. Patrick's cathedral in New York city, the finest church edifice in the country. Soon after the beginning of the rebellion he went abroad, at the request of president Lincoln, to secure the friendly offices of foreign courts, particularly that of France; and in 1863 he publicly addressed the draft-rioters in New York, dissuading them from violence.

HUGHES, THOMAS, English author and politician, second son of John Hughes, esq., of Donington Priory, Newbury, Berkshire, was b. at Uffington, Berks, in 1823. He was educated at Rugby under the celebrated Dr. Arnold; entered Oriel college, Oxford, in 1841, and took his degree of B.A. in 1845; was called to the bar at Lincoln's Inn in 1848, and became a member of the chancery bar. In 1856 he gave to the world *Tom Brown's School-days*—a picture of life at a public school, evidently written from the author's own personal experience, and recording the vivid and enduring impressions he brought with him from Rugby. This work attained great popularity both in England and America, especially among the young. It was followed, in 1858, by *The Scouring of the White Horse;* in 1861, by *Tom Brown at Oxford*, in which the mental history of his hero is continued, with sketches of college life and incidents; and in 1869, by *Alfred the Great.* Hughes pursued meanwhile the study and practice of the law. He gained the confidence and good-will of the working-classes by endeavoring to promote a better understanding between masters and men, and by teaching the latter the value of co-operation as a means of social elevation. He has, however, never failed courageously to rebuke the narrow prejudices and mischievous views held by certain members of trades-unions. At the general election for Lambeth in 1865, he was placed at the head of the poll, the working men being especially enthusiastic in securing his return. He was returned for Frome in 1868, which he continued to represent till 1874, and always took a prominent part in debates relating to the combinations of trades-unions, and the amendment of the law of master and servant. He was appointed queen's counsel in 1869. Hughes has written various pamphlets and articles in reviews.

HUGHS, a co. in s. central Dakotah, on the Missouri river, formed after the census of 1870.

HUGO, VICTOR MARIE, Vicomte, one of the most distinguished French writers of the present day, was b. Feb. 26, 1802, at Besançon, where his father was then commandant of the garrison. His mother was a native of La Vendée, and from her he imbibed romantic royalist sentiments, although his father was a most devoted follower of Napoleon. His youth was spent partly with his mother in Paris, partly in Italy and Spain, where his father held high appointments. He early acquired distinction by his poetic effusions; and before he was 30 years of age, his published works were numerous, and his name famous. Odes and ballads, romances, dramas, etc., flowed from his prolific pen. Shortly before the revolution of 1830 a literary revolution took place, at the head of which was Hugo. A band of young men, imaginative, ardent, and confident, sought to renovate French literature, by departing from classic rules and models, substituting a varied and very irregular verse for the monotonous Alexandrines of the old school, and making art precisely conform to nature, which they carried so far as even to bring into prominence things disagreeable, which nature herself is displeased with, and teaches us to keep out of sight. The new school, *la jeune France*, as they called themselves, formed the *Romanticists*, and their opponents, the Classicists. The literary war lasted several years. Hugo's drama of *Marion Delorme* was received with enthusiasm; and he added to his reputation by the publication of *Feuilles d'Automne.* In 1832 the ministry suspended one of his dramas, *Le Roi s'amuse;* but his popularity continued to increase, and in 1837 Louis Philippe made him an officer of the Legion of Honor, and in 1845 a peer of France. After the revolution of 1848 he was elected to represent Paris, both in the constituent and in the legislative assembly, in which he manifested democratic principles, and was one of the members of the extreme left who were banished from France for life by Louis Napoleon. He went to reside in the island of Jersey. In 1852 he assailed the ruler of France in a political pamphlet, *Napoleon le Petit;* and next year, in *Les Châtiments*, a series of poems written with great *verve*, in the same spirit. In 1856 he published his *Contemplations.* He refused to avail himself of the amnesty of Aug. 15, 1859; but on the fall of the empire, hastened back to his native country, joined in the republican movement, and was returned to the national assembly at Bordeaux, which, however, he soon quitted in disgust. He then went to Brussels, but the Belgian government expelled him from the country, and he had to seek refuge in Vianden, a village of Luxemburg, where *L'Année Terrible* was composed. Returning to Paris in July, 1871, he pleaded earnestly, but without effect, for the lives of the Communists. Hugo has given an account of his life in *Actes et Paroles*, 1870–72. In 1862 appeared *Les Misérables;* in 1869, *L'Homme qui Rit; Quatrevingt-treize* in 1874; his *Speeches* in 1875; the *Légende des Siècles*, 1877; *L'Histoire d'un Crime*, 1878; and *Le Pape*, a poem, 1878. Hugo's writings are often extravagant both in form and substance, and sometimes marred by an affected triviality of images and harshness of versification. Yet they have also great excellences; the command of language shown is wonderful; and as a lyric poet Hugo has, perhaps, never been equaled in France.

HU'GUENOTS (probably corrupted from the Ger. *Eidgenossen*, confederates), the name formerly given in France to the adherents of the Reformation, which movement commenced almost simultaneously in France and Germany. One of the most eminent names in the early history of French Protestantism is that of Farel (q.v.), and one of the first supporters of its cause was Margaret of Valois, queen of Navarre, the sister of Francis I. Subsequently, in the time of Calvin, many of the nobles and middle classes embraced the reformed religion. Francis I., however, opposed it with great severity,

and caused many to be burned as heretics. The alliance of Henry II. with the German Protestants gave at first an impulse to the cause of the reformation, but the aspect of things was again changed when the family of Guise obtained the ascendancy at court. Under Francis II., a chamber (*chambre ardente*) was established in each parliament for the punishment of Protestants; and executions, confiscations, and banishments were common in all parts of the kingdom. The Protestants took up arms against the government, choosing Louis I., prince of Bourbon-Condé, for their leader. On Feb. 1, 1560, in a meeting at Nantes, they resolved to petition the king for freedom of religion, and for the removal of the Guises; and in the event of his refusal, to seize the king's person, and proclaim Condé governor-general of the kingdom. But the court, being apprised of the conspiracy, fled from Blois to Amboise, and the duke of Guise was appointed governor-general. Some bands of Protestants, approaching Amboise with weapons in their hands, were easily defeated and taken; 1200 died by the hand of the executioner. The edict of Romorantin, in May, 1560, took the prosecution of heretics out of the hands of the parliament, and gave it into those of the bishops. By the assembly of notables in August, it was resolved that the whole matter of religion should rest until the next assembly of the states. Whilst the Guises plotted the death of the Protestant leaders, Charles IX. ascended the throne, a prince not yet of age; and the queen-mother, Catharine de' Medici (q.v.), having removed the Guises from the helm of the state, was compelled to seek the support of the Protestants against them and their party. In July, 1561, appeared an edict which freed the Huguenots from the penalty of death. For the complete termination of strife, the court opened a religious conference at Poissy on Sept. 3. The chief disputants were the cardinal of Lorraine on the one side, and Theodore Beza (q.v.) on the other. The effect of the discussion was to unite and embolden the Protestants, with whom the machinations of the Guises forced Catharine into closer alliance. On Jan. 17, 1562, appeared an edict, giving noblemen the right of the free exercise of their religion on their own estates.

The Guises and their partisans became exasperated. On Mar. 1, 1562, a company of Protestants met in a barn at Vassy for religious exercises, was attacked, and many of them were massacred by the followers of the duke of Guise. On this, Condé hastened to Orleans, and called his co-religionists again to his standard; whilst the Guises took possession of the persons of the king and his mother, and proclaimed the Protestants rebels. On Sept. 11, 1562, the royal troops, after much bloodshed, took Rouen, and on Dec. 19 a battle was fought at Dreux, in which, after a hard struggle, the Protestants were defeated. The duke of Guise marched on Orleans, but was assassinated in his camp before that city, Feb. 18, 1563. Hereupon the queen-mother hastened to conclude the peace of Amboise on Mar. 19, by which the Protestants were allowed the free exercise of their religion, except in certain districts and towns. Catharine, however, hated the new faith, and formed a close alliance with the Spaniards for the extirpation of heresy, retrenched the new liberties of the Protestants, and made attempts upon the liberty and the life of Condé and of the admiral Coligny (q.v.). These leaders of the Protestant party adopted the resolution of taking possession of the king's person. The court fled to Paris, which Condé invested; but on Nov. 10, 1567, a battle was fought at St. Denis between Condé and a much superior force under the constable Montmorency (q.v.), in consequence of which Condé fell back into Lorraine, where he effected a junction with an auxiliary force of 10,000 men from Germany, under prince John Casimir. After this, he again threatened Paris; upon which Catharine concluded peace at Longjumeau on Mar. 27, 1568, re-establishing the terms of the treaty of Amboise. Nevertheless, she proceeded to persecute the Protestants, of whom 3,000 were assassinated or executed. The Protestants having, however, received assistance in troops from Germany, and in money and artillery from England, began the third religious war. But on Mar. 13, 1569, they were defeated, and Condé their leader slain, at Jarnac by the royal troops under the duke of Anjou, afterwards Henry III. These misfortunes greatly dispirited the Protestants. Jeanne d'Albret, queen of Navarre, endeavored to reanimate them in an assembly at Cognac, and set up her son, afterwards Henry IV., as the head of the Protestant cause. Coligny became their military leader, and having received further assistance of troops from Germany, he laid siege to Poictiers, but was again defeated by the duke of Anjou at Montcontour, on Oct. 3. Fresh reinforcements from England, Switzerland, and Germany enabled Coligny to take Nimes in 1569, and to relieve Rochelle, whilst Lanoue obtained a victory over the royal troops at Luçon. Catharine and her son now sought for peace, to which the Protestants, weary of the hard contest, consented. The treaty, concluded at St. Germain-en-Laye on Aug. 8, 1570, gave to the Protestants an amnesty, the free exercise of their religion everywhere except in Paris, and the possession of a number of places of security.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery, and by a general massacre of Protestants on St. Bartholomew's day (q.v.) 1572. Although deprived of their leaders, and weakened by the slaughter of great numbers of their best and bravest, the Protestants flew to arms. The duke of Anjou, after having lost his army before Rochelle, took advantage of his election to the throne of Poland, and on June 24, 1573, concluded a peace, by which the Protestants obtained the free exercise of their religion in their places of security, Montauban, Nimes, and Rochelle, and a certain concession of liberty of conscience. A

section of the Roman Catholic nobility, at whose head was the duke of Alençon, the youngest son of Catharine, from purely political motives, united with the Protestants in opposition to the government of the queen-mother and the Guises. Catharine, therefore, incited her third son, Henry III., who had now succeeded to the throne, immediately to recommence hostilities against the Protestants. But, contrary to all expectation, the Protestant cause was in the highest degree prosperous during the year 1575. A peace was concluded at Beaulieu on May 8, by which the Protestants were freed from all restrictions in the exercise of their religion, and obtained a number of places of security. The king also paid their German auxiliaries. The duke of Guise, thus frustrated in his political designs, originated a Catholic association, called the Holy League, at the head of which the king put himself in the assembly of the states at Blois, on Nov. 6, 1576, and then the sixth religious war began. Peace was, however, again concluded by the king himself at Bergerac, in Sept., 1577, on the former conditions; and Catharine, to diminish the power of the duke of Guise, entered into a private treaty with Henry of Navarre at Nerac, by which several places of security were made over to the Protestants. The terms of peace being violated by the court, Henry I., prince of Condé, son of Louis I., and, like his father, a leader of the Protestant party, commenced the seventh religious war (called the *guerre des amoureux*) in Nov., 1579, by the occupation of Lafère, and Henry of Navarre, in April, 1580, took Cahors. But Condé, having been driven out of Lafère by Matignon, and Henry of Navarre vanquished at Mont-Crabel by Biron, peace was concluded at Fleix, Nov., 1580.

There was now a comparatively long interval of repose till 1584, when, by the death of the duke of Anjou (formerly of Alençon), Henry of Navarre became heir to the throne of France. Hereupon Henry, duke of Guise, exerted himself for the revival of the league, entered into an alliance with Spain and the pope for the extirpation of heresy, declared the cardinal of Bourbon heir to the throne, and began hostilities against the Protestants. This war is commonly known as the "war of the three Henries." The king soon made terms with him, and declared all the privileges of the Protestants to be forfeited. The Protestants, having obtained troops from Germany and money from England, entered on the eighth religious war, which was prosecuted with various success, Henry of Navarre commanding the Protestant army. The duke of Guise, in the midst of these troubles, grasped the whole power of the state. But his designs with regard to the throne having become very evident, the king caused him and his brother the cardinal to be assassinated at the assembly of the states at Blois in Sept., 1588. In less than a year, the king was himself assassinated by a monk named Jacques Clement, and Henry of Navarre succeeded to the throne, and signed the famous EDICT OF NANTES (see NANTES), April 13, 1598, by which the rights of the Protestants were established and enlarged.

Under the reign of Henry IV., whose great minister, Sully, was himself a Protestant, the Protestants lived in tranquillity. But when, during the minority of Louis XIII., Mary de' Medici, the queen of Henry IV., assumed the reigns of government, the independence which the Protestants enjoyed stood too plainly in the way of a court bent upon absolutism. The king, indeed, took an oath in 1614 to maintain the edict of Nantes, but the marriage treaties with the Spanish court excited the apprehensions of the Protestants to such a degree that, in Nov., 1615, they made common cause with the prince of Condé, who had then set up the standard of rebellion. This they did contrary to the advice of the most sagacious of their own party. Although by the treaty of Loudun, May 4, 1616, they obtained a new confirmation of their freedom of worship, the court now only waited for an opportunity of breaking at least their political power. In June, 1617, a royal edict commanded the entire suppression at once of the Protestant church, and of political privileges, in the province of Béarn; but the provincial court at Pau refused to register the edict, and the matter lay over till 1620, when, at the instigation of the Jesuits, and of his favorite De Luynes, the king carried the edict into full effect by force of arms. The Protestants throughout all France took alarm, and hostilities again broke out in May, 1621. At the head of the Protestants were the two brothers, the duke of Rohan and the prince Soubise. Their cause, however, was feebly maintained; almost all the Protestant towns fell into the hands of the king, force, stratagem, and bribery being equally employed. At last, after the capitulation of Montpellier, Oct. 31, 1622, there followed a general peace, by which the edict of Nantes was confirmed, but the right of prohibiting the assemblies of the Protestants was assumed on the part of the crown. The court, however, paid little attention to the stipulations of the treaty, and when the government was involved in difficulties in Italy, the Protestants took the opportunity again to rise in arms. Soubise, with a fleet furnished by the town of Rochelle, oftener than once defeated the weak royal navy. Cardinal Richelieu (q.v.), who was now at the helm of affairs, found himself under the necessity of making offers of pacification, which were rejected. Hereupon the cardinal resolved upon the capture of Rochelle, the most important stronghold of the Protestants. This he accomplished after a heroic resistance by the inhabitants. The fall of Rochelle was speedily followed by that of Nimes, Montauban, Castres, and all the other Protestant strongholds. Now left defenseless, the Protestants were entirely dependent on the will of the court, which, however, made no attempt to deprive them of their liberty of conscience. It was Louis XIV., when he became superstitious in his old age, who, at the

instigation of Madame de Maintenon and his confessor Lachaise, commenced anew the persecution of the Protestants. He gradually deprived them of their equal civil rights, and endeavored to put down the Protestant church altogether. Bodies of troops, accompanied by monks, passed through the southern provinces, compelling the inhabitants to renounce their religion, demolishing the places of worship, and putting to death the preachers. Hundreds of thousands of Protestants fled to Switzerland, the Netherlands, England, and Germany. In vain was it attempted to restrain this self-expatriation by cordons along the borders. Many Protestants also made an insincere profession of Roman Catholicism. These, on the slightest appearance of relapse, were put to death. On Oct. 23, 1685, Louis at last revoked the edict of Nantes. (See Rulhière, *Eclaircissements Historiques sur les Causes de la Révocation de l'édit de Nantes*, 2 vols. Paris, 1788.) Hereupon began a new flight, followed by a still more fearful persecution of the Protestants. Their marriages were declared null; their children deprived of the right of inheritance, and forcibly shut up in convents; their preachers indiscriminately put to death. From the vicinity of Nimes, where they had always been very numerous, thousands betook themselves to the mountains of the Cevennes, and continued the exercise of their religion in secret. Amongst these and the mountaineers of the Cevennes, a remarkable fanatical enthusiasm displayed itself, and, under the name of Camisards, they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The *War of the Cevennes* (q.v.), or *Camisard War*, was not terminated till 1706, the suppression of the local rebellion being attended with circumstances of great cruelty. France had lost by this time more than a million of her most active, enterprising, and industrious citizens and, notwithstanding all the persecutions, about two millions continued to adhere to the Protestant religion.

The partial repose which the Protestants enjoyed for more than ten years was attended by a revival of their worship, especially in Provence and Dauphiné. In 1724, therefore, Louis XV., at the instigation of the Jesuits, issued a severe edict against them. The spirit of the age, however, now began to be opposed to persecution. An edict of 1752 declared marriages and baptisms by Protestant ministers to be null, and required the repetition of them by the Roman Catholic clergy. But when, upon this, many began again to flee from their country, the disgust of the Roman Catholics themselves was so much excited, that the court recalled the edict. Montesquieu successfully advocated the cause of toleration; Voltaire did much to promote it by his exposure of the judicial murder of John Calas (q.v.). At last, by an edict in 1787, which indeed, was not registered by the parliament till 1789, Louis XVI. declared the Protestant marriages and baptisms to be valid, and restored to the Protestants equal civil rights, except that they might not be advanced to public offices and dignities. Even in 1789 a proposal for the complete emancipation of the Protestants was rejected by the national assembly, which, however, admitted Protestants, and even Protestant preachers as members without objection; and in 1790, it passed a decree for the restitution of all the properties of non-Catholics confiscated since the time of Louis XIV. The *Code Napoleon* gave Protestants in France equal civil and political rights with Roman Catholics. The charter granted by the Bourbons acknowledged the freedom of Protestant worship, and the state pledged itself for the maintenance of the pastors; yet, under the government of the restoration, the privileges of Protestants were in many ways circumscribed. After the revolution of July, 1830, the reformed charter of France proclaimed universal freedom of conscience and of worship, which principle has been maintained in subsequent changes. Protestants are not now subjected to many exceptional hardships, and have in various important instances been protected by the imperial authority from the arbitrary exercise of power attempted by illiberal local magistrates adverse to their religion. But the *recognized* Protestant church—in which are included both *Reformed* and *Lutherans*, and of which the pastors receive small salaries from the state (see FRANCE)—was not till 1872 permitted to hold synods or general assemblies; at a synod held in that year the conservative party in the church, in spite of some opposition, carried their proposal that the church, which had long been without a formally binding creed, should adopt an evangelical confession. See Félice, *Hist. des Protestants en France* (1851); Haag, *La France Protestante* (1859); Smiles, *The Huguenots in England* (1873).

HUILE DE CADE, a brownish, inflammable, oily liquid, obtained by the dry distillation of the wood of *juniperus oxycedrus*. It has a strong odor of tar, and an acrid, caustic taste. It is employed externally in veterinary medicine, and also for the human subject. It is a good local remedy in toothache. It has been given internally in worms, but is a dangerous and uncertain remedy.

HUL'DA, or **HOLDA**, "the friendly, the benignant," well known in old German legends and traditions as *Frau Holle*, was originally a goddess of marriage and fecundity. Worshiped and invoked by maids and wives, to the former she sent bridegrooms, to the latter, children; great numbers of whom surrounded her in her favorite haunts in the depths of the sea, or the hearts of hills. She was also the patroness of agriculture and domestic life, with its manifold employments. Sometimes she was regarded as a celestial being, and long ago the people used to say when the snow fell: "Hulda is making her bed."

HULIN, or HULLIN, PIERRE AUGUSTIN, 1758–1841; b. Paris; entered the French army at 13 years of age, and was a sergeant at the opening of the revolution. He was on the side of the people, and was distinguished for bravery and humanity at the taking of the Bastile. He was imprisoned during Robespierre's rule, but released on the death of the tyrant. Thenceforward he was an officer under Bonaparte, and in 1844 became general of division. He was president of the court that condemned the duke d'Enghien to death, a circumstance that he deemed necessary, many years afterwards, to explain in an elaborate work.

HULK, a name given to any old ship unfit for sea-service, which is used in harbor as a depôt of some sort. In the great naval harbors, there are coal-hulks, powder-hulks, convict-hulks, and hulks to which the crews of vessels repairing are turned over.

HULL. The hull of a ship is her main body, exclusive of masts or rigging.

HULL, or KINGSTON-ON-HULL, an important and flourishing English river-port, a parliamentary and municipal borough and co. of itself, is situated in the East Riding of Yorkshire, in a low, level plain on the northern bank of the Humber, at the confluence of the Hull with that river, 53 m. e.s.e. of York. Of the ecclesiastical edifices, the most notable are the church of the Holy Trinity, a beautiful and ornate Gothic structure, the transept of which is the oldest English brick-building in the country; and St. Mary's church, Lowgate, one-half of which was removed to make room for the mansion-house of Henry VIII., who occasionally resided here. The most important educational establishments are the Hull grammar-school, and Trinity house school, where 36 boys receive a nautical education. An equestrian statue of William III. stands in the market-place, and a statue of Wilberforce. Among many other benevolent establishments, the Trinity house, instituted for the relief of decayed seamen, and the Charter house, an endowed institution for the poor, are the most worthy of note. A prettily laid-out people's park was presented to the town in 1860 by sir P. C. Pearson, then mayor. A town-hall, a new exchange, and a new theatre were all opened in 1866. A spacious borough jail was built during 1866–1868.

The docks—the Old dock, the Humber, the Junction, the Railway, and the Victoria docks—are very extensive, the last named being the largest. It occupies part of the site of an old citadel with a battery of 21 guns, which till 1864 commanded the entrance of Hull roads and the Humber. A new dock which greatly increases the accommodation for shipping was opened in 1869. Hull was one of the first ports in England to engage in the whale-fishery, an enterprise which it has now almost abandoned; but its fisheries for edible fish employ nearly 700 boats. Hull is a principal steam-packet station, and ocean steamers ply regularly to many of the principal ports of Belgium, the Netherlands, and Denmark. It is the great outlet for the woolen and cotton goods of the midland counties, with which it has direct communication, by means of railway, river, or canal. Many ship-building yards are in operation here, and the chief manufactures are those principally to which a flourishing port gives rise, as ropes, canvas, chain, chain-cables, machinery, etc. Many mills of various kinds are here carried on, as well as chemical factories, tanneries, potteries, and sugar-refineries. Immense commercial intercourse subsists between Hull and the countries of northern Europe, the principal exports being woolen and cotton manufactured goods, and the imports timber, corn, wool, iron, flax, hemp, tallow, hides, pitch, bones, and horn. In 1875, 8,986 vessels, of 3,070,598 tonnage, entered and cleared the port. Hull returns 2 members to parliament. Pop. '71, 123,408. Constituency, 19,012, including 1298 freemen.

HULL, HOPE, 1763–1818; b. Md., the son of an Englishman. He removed to Georgia near the close of the century, and was one of the chief founders of the Methodist denomination in that state.

HULL, ISAAC, 1775–1843; b. Conn. In early life he was a seaman in the merchant service. He was made a lieut. in the U. S. navy in 1798, and in 1800 was first lieut. on the frigate Congress. He served with credit in the war with Tripoli, and became a capt. in 1806. His greatest fame was won in the second war with Great Britain in the capture of the British frigate *Guerrière* by the U. S. frigate *Constitution* under his command. This was the first and the most famous naval victory of the war. After peace Hull commanded the U. S. squadrons in the Pacific and the Mediterranean, and was one of the board of naval commissioners.

HULL, WILLIAM, 1753–1825; b. Conn., graduated at Yale, and practiced law. In the revolutionary army he served with some note, being in the battles of White Plains, Trenton, Stillwater, Princeton, Saratoga, and Monmouth. For his bravery in one instance he was thanked by congress. He became a member of the Massachusetts state senate. In 1805 Jefferson appointed him governor of Michigan territory, and in 1812 he was put in command of the army of the north-west. Under a combination of unfavorable circumstances he surrendered Detroit to the British. For this he was court-martialed and sentenced to death, but was reprieved by Madison in consideration of his age and former good services. Ten years afterwards he published an elaborate defense of his act. Later writers have fully vindicated his reputation.

HULLAH, JOHN, b. England, 1812; a teacher of music, coming first before the public in the score for Dickens's *Village Coquettes*. He has been professor of vocal music and harmony in King's college, and several other institutions, and conductor of the orchestra and chorus in the royal academy of music. In 1872 he was appointed musical instructor for the United Kingdom. Among his works are a *Grammar of Harmony;* a *Grammar of Counterpoint;* a *History of Modern Music;* and *The Transition Period of Musical History.*

HULSEAN LECTURES, etc. The Rev. John Hulse, of Elworth, in the co. of Chester, was b. at Middlewich, in 1708, and was educated at St. John's college, Cambridge. Having no children, he bequeathed the bulk of his property to the university. His will, an extraordinary document, containing 400 pages folio, of closely-written manuscript, with nine codicils appended, provides for the founding of two divinity scholarships in St. John's college, the Hulsean prize, the office of Christian advocate, and that of Hulsean lecturer or Christian preacher. By a statute confirmed by the queen in council in 1860, the office of Christian advocate was changed into a professorship, called the Hulsean professorship of divinity. Bishop Ellicot was the first professor under the new statute. The office of Hulsean lecturer, or preacher, is an annual one; and the duty of the lecturer is to preach not less than four, nor more than six sermons before the university in the course of the year.

HU'MANISTS (Lat. *literæ humaniores*, polite letters), the name assumed in the beginning of the 16th c. by the party who devoted themselves specially to the cultivation of classical literature, and who, as not unfrequently happens in the enthusiasm of a new pursuit, arrayed themselves in opposition to the received system of the schools, not alone in the study of the classical languages, but even in philosophy, and eventually in theology.

HUMANITA'RIANS, the name assigned to the several classes of anti-Trinitarians, who regard Christ as a mere man, and refuse to ascribe to him any supernatural character, whether of origin or of nature. In this class are commonly enumerated the early Judaizing sects of Ebion and Cerinthus; but this is by no means certain, at least as regards the former, who taught that at the baptism in the Jordan the Demiurge descended upon Christ, and was united to him. The earliest recorded author of the purely Humanitarian theory is Theodotus of Byzantium, surnamed the Currier, who, having denied Christ in time of persecution, defended himself afterwards by declaring that in so doing "he had denied not God, but man." A contemporary of Theodotus, Artemon, taught in like manner that Christ was a mere man, and asserted that such had been the universal belief of Christians till the time of Zephyrinus, 202. These opinions must be carefully distinguished from the doctrines of the various sects of Arians, even the lowest schools of which have admitted the pre-existence of Christ, and his pre-eminence among the creatures of God.

The name Humanitarian is also sometimes applied to the disciples of St. Simon, and in general to those who look to the perfectibility of human nature as their great moral and social dogma, and ignore altogether the dependence of man upon supernatural aid, believing in the all-sufficiency of his own innate powers.

HUMANITIES, from the Latin *humanitas*, denoting refinement of taste, mental culture; called also *humanity studies*, and include grammar, rhetoric, poetry, Greek and Latin, in distinction from natural and mathematical sciences.

HUMBER, the continuation and estuary of the river Ouse (q.v.).

HUMBERT IV., b. 1844; King of Italy, eldest son of Victor Emmanuel. At an early age he obtained an insight into political and military life under the guidance of his father, whom he attended during the war of Italian independence, although he was then too young to take an active part in the struggle. The youthful heir to the throne was more closely connected with the movement for the unification of Italy, which followed the events of 1859. In particular he took part in the work of reorganizing the ancient kingdom of the two Sicilies, and in July, 1862, he visited Naples and Palermo, where he shared the popularity of Garibaldi. When the war between Prussia and Austria was imminent, prince Humbert was dispatched to Paris to ascertain the sentiments of the French government in reference to the alliance between Italy and Prussia. On the outbreak of hostilities he hastened to take the field; obtained the command of a division of gen. Cialdini's army with the title of lieut.gen.; and took a gallant part in the disastrous battle of Custozza, June 23, 1866. On April 22, 1868, he married, at Turin, his cousin, the princess Marguerite Marie Thérèse Jeanne of Savoy, daughter of the duke Ferdinand of Genoa, brother of king Victor Emmanuel. This union resulted in the birth of a son at Naples, Nov. 11, 1869, who received the names of Victor Emmanuel Ferdinand Mary Januarius, and the title of prince of Naples. After the seizure of Rome by the Italian troops in 1870, prince Humbert took up his residence there. He succeeded to the throne on the death of his father, Jan. 9, 1878. As he was entering Naples, Nov. 17, 1878, a man named Giovanni Passanante approached his carriage and attempted to assassinate him with a poniard, but the king escaped with a slight scratch. Signor Cairoli, however, the prime-minister, who was with him, was seriously wounded.

HUMBLE-BEE, *Bombus*, a genus of *social* bees (see BEE), having a thick and very hairy body, the hairs often arranged in colored bands; and also differing from the honey-bees in having the tibiæ of the hinder-legs terminated by two spines. The species are numerous, and are found in almost all parts of the world, from the equator to the utmost polar limits of vegetation, but they seem to abound most of all in temperate climates. About forty are natives of Britain, one of the largest of which, and of British hymenopterous insects, is the common humble-bee (*B. terrestris*), the *bumbee* (boom-bee) of the Scotch; black, with a yellow ring before the wings, and another on the abdomen, the apex of the abdomen white. Another of the largest species is the RED-TAILED BEE (*B. lapidarius*), and one of the most abundant is the yellow and orange MOSS-BEE (*B. muscorum*), the *foggie* of the Scotch. Some of the tropical species are much larger than any found in Britain. The name humble-bee is supposed to be a modification of *hummel* or *hummer bee*, and to refer to the loud hum produced by the wings of these insects.

Humble-bees do not form communities so large as those of honey-bees; seldom more than two or three hundred occupying one nest, and in some species not more than fifty or sixty. The females are much less prolific than those of honey-bees. The community is dissolved on the approach of winter, the males and workers die, and only females remain in a torpid state—among moss, in rotten wood, or in some other situation where they may enjoy protection from frost, and concealment from enemies—to perpetuate the race by founding new communities in the ensuing spring. The nests of some species, as *B. terrestris*, are in holes in the ground, at the depth of a foot or more, floored with leaves, and lined with wax, and often entered by a winding passage. Others, as *B. lapidarius*, make their waxen nests among stones; while others still, as *B. muscorum*, make them among moss, which they mix and join with wax. The nests are enlarged as the community increases. Some of the eggs are deposited in balls of mingled pollen and honey, on which the larvæ feed, one ball containing several larvæ; afterwards, eggs are also deposited in waxen cells. Workers are chiefly produced in the earlier part of the season, males and perfect females in the latter part of it. The females are larger than the males and workers. Humble-bees differ from honey-bees in their females existing together in the same community without seeking to destroy one another. There is among them nothing analogous to swarming. Their combs do not exhibit the beautiful regularity of structure which characterizes those of honey-bees; but cells of a comparatively coarse appearance are clustered together, with silken cocoons of pupæ, balls of the kind already noticed, and open cells or pots filled with honey, the frequent prize of schoolboys and youthful haymakers, who know well how to open and plunder the humble-bee's nest. Many animals are also expert in this, as badgers, foxes, rats, etc., which, however, devour the brood as well as the honey.

HUM'BOLDT, a river in the w. part of Utah territory, United States, formed by the union of two streams which rise on the w. side of the Humboldt mountains. It is a small and rapid stream, 350 m. in length, unnavigable even for canoes, strongly impregnated with alkaline matter, and after a westerly course, falls into a lake 40 m. in circumference, known as the Sink of Humboldt's river, which has no outlet. The banks are destitute of trees or shrubs, and the region through which it flows is one of the most barren in Utah. The Pacific railroad, traversing the United States from e. to w., runs through the valley of the Humboldt.

HUMBOLDT, a co. in n.w. California, bordering on the ocean, and intersected by Mad and Eel rivers; 2,800 sq.m.; pop. '70, 6,140. It is mountainous, with fertile valleys and rolling prairie, and is in a large degree covered with timber. Lumber is the main article of export. The immense red-wood trees are a feature of the region. Co. seat, Eureka.

HUMBOLDT, a co. in n.w. Iowa, on the forks of Des Moines river; 432 sq.m.; pop. '70, 2,596. The surface is mostly level and the soil fertile; chief productions: corn, hay, and oats. Co. seat, Dakotah.

HUMBOLDT, a co. in n.w. Nevada, on the Oregon border; intersected by Humboldt river; 19,000 sq.m.; pop. '75, 2,437. The surface is mountainous and unfruitful; water and timber are scarce. Copper, lead, and silver are found. Co. seat, Winnemucca.

HUMBOLDT, FRIEDRICH HEINRICH ALEXANDER, Baron von, one of the greatest of naturalists, and who has contributed more than any man of modern times to the progress of several departments of physical science, was b. at Berlin, Sept. 14, 1769. His father, whom he lost when he was not quite ten years of age, was chamberlain to the king of Prussia. He studied at the universities of Frankfort-on-the-Oder, Berlin, and Göttingen. His love of natural history was very strongly manifested at this period; and during his residence at Göttingen (1789–90), he made visits of scientific exploration to the Harz and the banks of the Rhine, the fruit of which was his first publication, *On the Basalts of the Rhine*, etc. In the spring and summer of 1790, he accompanied George Forster in a tour through Belgium, Holland, England, and France. In June, 1791, he entered the mining academy at Freiberg, where he enjoyed the private instructions of Werner. His eight months' residence here led to the subsequent publication of his *Flora Subterranea Fribergensis et Aphorismi ex Physiologia Chemica Plantarum* (Berlin, 1793). He was afterwards appointed to an office in the mining department, and spent some years in this

capacity, chiefly at the Fichtelgebirge, in Upper Franconia. His researches here resulted in a work *On the Irritability of the Muscular and Nervous Fibers, with Conjectures regarding the Chemical Process of Life in the Animal and Vegetable World* (*Ueber die Gereizte*, etc., 2 vols., Berlin, 1797–99).

The desire of visiting tropical countries, however, led him to resign his office, and devote himself entirely to the study of nature. He spent three months at Jena, where he was the intimate associate of Goethe and Schiller, and studied anatomy under Loder. Circumstances now led him to Paris, where he contracted a friendship with a distinguished young botanist, Aimé Bonpland (q.v.), afterwards his companion in many and various scenes. Some time after, he obtained permission from the Spanish government to visit all the Spanish settlements in America and the Indian ocean, with every additional favor which could promote his researches in the various departments of natural science. He sailed from Corunna along with Bonpland, on June 5, 1799. They visited Teneriffe, ascended the peak, and made many scientific observations. On July 16 they arrived at Cumana in South America, and in the course of five years explored a vast extent of territory in Venezuela, Granada, Ecuador, and Peru, whence they sailed for Mexico, which they crossed from w. to east. On March 7, 1804, Humboldt sailed from Vera Cruz for Havana, where he spent two months, completing the preparation of materials afterwards employed in his *Essai Politique sur l'Isle de Cuba* (Paris, 1826). From Havana he proceeded by sea to Philadelphia, and thence to Bordeaux, where he arrived after a course of travels unparalleled for variety and importance of scientific results, not only in the different departments of natural history, but also in geography, statistics, and ethnography.

Humboldt resided in Paris till March, 1805, occupied in the arrangement of his collections and manuscripts, and jointly with Gay-Lussac in experiments on the chemical constitution of the atmosphere. Having visited Italy, and returned to Berlin, he accompanied prince Wilhelm of Prussia in 1807 on a political mission to France, and obtained leave from the government of his own country to remain there, for the publication of his travels, for which the disturbed state of Germany at that time did not allow proper opportunity. He continued to reside in Paris till 1827. In 1807–17, his great work, embodying the chief results of his travels, appeared in two forms, folio and quarto, in each consisting of 29 volumes, and containing 1425 copper-plates. The wish of the king that he should reside in his native country was gratified in 1827, when he proceeded to Berlin, and there, in the winter of 1827–28, he gave lectures on the *Cosmos*, or physical universe.

In 1829 Humboldt again became a traveler, the emperor Nicholas then sending out a well-appointed expedition to the n. of Asia, to explore the Ural and Altai mountains, the Chinese Dsongarei, and the Caspian sea. In this expedition Humboldt was accompanied by his two friends, Ehrenberg and Gustavus Rose. Its principal results were the scientific examination of the beds which produce gold and platina, the discovery of diamonds in an extra-tropical region, the astronomical determination of positions, magnetic observations, and geological and botanical collections. The whole journey occupied nine months, and extended to 2,320 miles. It is described in Rose's *Mineralogical and Geological Travels to the Ural, the Altai, and the Caspian Sea* (*Mineralogisch-geognostischer Reise*, etc., 2 vols., Berlin, 1837–42); and in Humboldt's *Asie Centrale, Recherches sur les Chaines de Montagnes et la Climatologie comparée* (3 vols., Paris, 1843). This expedition must be regarded as having also led to much increase of our knowledge of the earth's magnetism, through the adoption by the emperor of Russia of Humboldt's proposal for the establishment of magnetic and meteorological stations from Petersburg to Pekin; which was followed, on Humboldt's application to the duke of Sussex, by the establishment of similar stations in the southern hemisphere.

The political changes of the year 1830 led to Humboldt's employment in political services. He had been long on friendly terms with the members of the house of Orleans, and therefore, after Louis Philippe ascended the French throne, he was chosen by the king of Prussia to carry to Paris his recognition of the new sovereign, and was afterwards, during the ensuing twelve years, frequently sent to Paris to reside for four or five months. He accompanied the king of Prussia also in visits to England, Denmark, etc. During this time, he published his *Examen Critique de la Géographie du Nouveau Continent* (5 vols., Par. 1835–38).

Humboldt spent the latter years of his long life at Berlin, where he occupied a high position at the Prussian court. His last great work, *Cosmos* (4 vols., Stuttg. 1845–58), has been unanimously recognized as one of the greatest scientific works ever published, exhibiting in most lucid arrangement many of the principal facts of the physical sciences, and their relations to each other. It has been translated into all the languages in which a book of science is required. The germ of the work was the author's *Views of Nature* (*Ansichten der Natur*, Stuttg. 1808). Humboldt died May 6, 1859.

It is not easy to estimate the amount of Humboldt's contributions to science. The geography of Spanish America was most imperfectly known previous to his travels there, during which he astronomically determined more than 700 positions, and he bestowed much labor on the preparation of the maps in which his discoveries were exhibited. His barometrical observations were likewise very numerous, as well as his observations on all points connected with meteorology. To him we are indebted for the most important

generalizations concerning magnetism and also climate, some results of which are exhibited in the isothermal and other lines which have begun to be drawn in our maps.

Among his botanical works, that on the geography of plants, *De Distributione Geographicâ Plantarum secundum Cœli Temperiem et Altitudinem Montium* (Paris, 1817), must be reckoned the most important. It was preceded by an *Essai sur la Géographie des Plantes* (Paris, 1805). The botanical discoveries made by himself and Bonpland in their American travels were given to the world in a number of works by Humboldt and Kunth, published at Paris from 1809 to 1834. He gave to the world also his observations, many of them most valuable, which were made at the same time, in zoology and comparative anatomy; and in a magnificent volume, *Vues des Cordillères et Monuments des Peuples Indigènes de l'Amerique*, he directed the attention of Europe to the monuments of a little known antiquity in America, and showed for the first time the possibility of combining artistic beauty with scientific accuracy. He published in 1823 an *Essai Geognostique sur le Gisement des Roches dans les deux Hemisphères* (Paris); and in 1831, *Fragments de Géologie et Climatologie Asiatique* (2 vols., Paris). In 1811 he produced a work on political economy, *Essai Politique sur le Royaume de la Nouvelle Espagne* (2 vols.). He obtained distinction also by his labors in the determination of the magnetic equator, and by his observations on electrical eels, and on the respiration of fishes and young crocodiles. See the great biographical work, edited by Bruhns, *Alexander von Humboldt, Eine wissenschaftliche Biographie* (1872; Eng. transl., 1872).

HUMBOLDT, KARL WILHELM, Baron von, the elder brother of the preceding, eminent as a statesman, and for his works in philology, æsthetics, and general literature, was b. at Potsdam, June 22, 1767, and educated at Berlin, Frankfort-on-the-Oder, and Göttingen. He eagerly studied antiquities, æsthetics, and the Kantian philosophy, as well as law, to which he professedly devoted himself. After traveling in Germany, France, and Switzerland, he acquired the rank of counselor of legation, but showed little inclination for official employment, and in 1791 married, and for some years resided chiefly on his wife's estate in Thuringia, and afterwards in Jena, associating most intimately with Schiller, and devoting himself to poetry and other literary and scientific pursuits. A valuable memorial of his friendship with Schiller is the correspondence between them (*Briefwechsel zwischen Schiller und Wilhelm von Humboldt*, Stuttg. und Tüb., 1830), published by him after Schiller's death. From 1797 to 1799 Humboldt resided partly in Paris and partly in Spain, and in 1801 became Prussian resident at Rome, where he remained for a number of years, in this capacity, and in that of minister-plenipotentiary, a most generous patron of young artists and men of science. From Rome he returned to his native country, to fill the high place of first minister of public instruction, in which capacity he did much to promote education in Prussia. The Berlin university owed its existence to him. In 1810 he went to Vienna as minister-plenipotentiary, and from this time he took part in all the most important political affairs in which his country was concerned. After 1819 he resided chiefly at Tegel, where he laid out fine pleasure-grounds, and formed a noble collection of sculptures by the greatest masters. He died April 8, 1835.

His earliest literary works were collected by himself under the title of *Æsthetic Essays* (*Æsthetische Versuche*, Brunswick, 1799). His *Collected Works* appeared at Berlin (7 vols. 1841–52). Humboldt devoted himself with the greatest eagerness and assiduity to the study of philology, and produced several works on the Basque tongue, and the evidence which it affords concerning the aboriginal inhabitants of Spain—the languages of the east, and various questions connected with oriental literature, and the languages of the South sea islands. One of his most important works is that *On the Kawi Language in the Island of Java* (*Ueber die Kawisprache*, etc., 3 vols., Berlin, 1836–40), published after his death by Edward Buschmann; the introduction to which, *On the Variety of Structure in Human Speech*, etc., and its influence on the intellectual progress of mankind, may be said to mark a new era in the science of philology, and has given occasion to many further researches and publications. *Wilhelm von Humboldt's Briefe an eine Freundin* ("Letters to a Lady Friend," 1847; Eng. transl., 1849), exhibit his character in a most pure and amiable light. See the admirable biography by Haym (1856).

HUME, DAVID, the philosopher and historian, was b. at Edinburgh on April 26, (O. S.) 1711. His father was the laird or proprietor of the estate of Ninewells in Berwickshire, but David being the youngest son had to make his own fortune with no other assistance than an education and the influence of his respectable family. He was educated at home and at the college of Edinburgh. His father designed law as his profession and he submitted to the initial steps of the proper practical training, but it was not a pursuit to his liking. Deserting it he experimented on a mercantile house in Bristol, but commerce was not more congenial to him than jurisprudence and he gave it a very short trial. He now became a musty student, devoting himself to books with no settled practical object before him. He has recorded his sufferings at this time from despondency and depression of spirits, caused apparently by the effects of monotonous study on the stomach. At 23 years of age he went to France and lived some time in La Fleche, where he describes himself as wandering about in solitude and dreaming the dream of his philosophy. In 1739 he published the first and second book of his *Treatise on Human Nature*—the germ of his philosophy and still perhaps the best exposition of

it, since it has there a freshness and decision approaching to paradox, which he modified in his later works. Although the dawn of a new era in philosophy, this book was little noticed. It was a work of demolition. By separating the impressions or ideas created on the thinking mind by an external world from the absolute existence of that world itself, he showed that almost everything concerning the latter was taken for granted, and he demanded proof of its existence of a kind not yet afforded. It was thus that he set a whole army of philosophers at work, either to refute what he had said or seriously to fill up the blanks which he discovered, and hence he originated both the Scotch and the German school of metaphysicians. In 1741 and 1742 he published two small volumes called *Essays Moral and Political;* they were marked by learning and thought and elegantly written, but are not among the more remarkable of his works. He felt keenly at this time the want of some fixed lucrative pursuit, and his longing for independence was the cause of a sad interruption to his studious and philosophical pursuits. He was induced to become the companion or guardian of an insane nobleman and had to mix with the jealousies and mercenary objects of those who naturally gather round such a center. In 1747 he obtained a rather more congenial appointment as secretary to gen. St. Clair, whom he accompanied in the expedition to the coast of France and the attack on port L'Orient, the depôt of the French East India company; this affair had no important results, but it gave Hume a notion of actual warfare. Next year he accompanied the gen. in a diplomatic mission to France, and as he traveled he took notes of his impressions of Holland, Germany, and Italy, which are published in his *Life and Correspondence.* In 1751 he published his *Inquiry into the Principles of Morals,* a work of great originality and one of the clearest expositions of the leading principles of what is termed the utilitarian system. At the same time he intended to publish his *Dialogues concerning Natural Religion,* but his friends, alarmed by the skeptical spirit pervading them, prevailed on him to lay them aside, and they were not made public till after his death. In his 35th year he had unsuccessfully competed for the chair of moral philosophy in Edinburgh, and at this period we find him unsuccessful in an attempt to obtain the chair of logic in Glasgow. Next year, in 1752, appeared his *Political Discourses.* Here again he made an era in literature, for in this little work he announced those principles of political economy comprehending the doctrine of free-trade, which it fell to his friend Adam Smith more fully and comprehensively to develop. He was appointed at this time keeper of the advocates' library with a very small salary, which he devoted to a charitable purpose. It was here that, surrounded with books, he formed the design of writing the history of England. In 1754 he issued a quarto volume of the *History of the Stuarts, containing the Reigns of James I. and Charles I.,* and presently completed this portion of the work in a second volume, bringing it down to the revolution. He then went backwards through the house of Tudor, and completed the work from the Roman period downwards in 1762. While so employed he published *Four Dissertations: the Natural History of Religion; of the Passions; of Tragedy; of the Standard of Taste* (1757). Two other dissertations intended to accompany these were canceled by him after they were printed—they are *On Suicide* and *The Immortality of the Soul,* and were subsequently printed in his works

In 1763 he went to France as secretary to lord Hertford's embassy; here he was in his element, and found fame at last. He became familiar with the brilliant wits and savants of the Parisian circle—with Turgot, D'Alembert, Helvetius, Holbach, Diderot, Buffon, Malesherbes, Crebillon, and the rest, as well as with the no less distinguished female eminences, De Boufflers, Page de Boccage, Geofrin, Du Deffand, and L'Espinasse. His sojourn in Paris was unfortunate in bringing him into intimacy with the restless, vain, and self-tormenting Rousseau, who, after experiencing much substantial kindness from Hume, got suspicious and forced him into a memorable quarrel. After his return home in 1766 he accepted the responsible office of under-secretary of state for she home department. In his own life he says: "I returned to Edinburgh in 1769 very opulent (for I possessed a revenue of £1000 a year), healthy and though somewhat stricken in years, with the prospect of enjoying long my ease and of seeing the increase of my reputation." His health gave way in 1674, and he died at Edinburgh Aug. 25, 1776. See Hume's *Life* by J. H. Burton (1850), and the admirable edition of his works by T. H. Green and T. H. Grosse (4 vols., 1875).

HUME, JOSEPH, politician, was b. Jan., 1777, at Montrose. His father was the master of a small coasting-vessel, who, dying while his family were young, left his widow and children in narrow circumstances. He was educated in the local schools of Montrose, and at the age of 13 was placed with an apothecary. He studied for the medical profession; was admitted in 1796 a member of the college of surgeons, Edinburgh; and became assistant-surgeon in the marine service of the East India company. He applied himself to the acquisition of the native languages, and during the Mahratta war, from 1802 to 1807, filled the office of Persian interpreter to the army. He also discharged duties connected with the prize agencies and the commissariat, and arrived in England, in 1808, with an honestly earned fortune of £30,000 or £40,000. He entered the house of commons in 1812, as M.P. for the borough of Weymouth and Melcombe Regis. The future radical was then of tory politics, and paid a sum of money for his seat, which he only enjoyed a few months. He obtained, in 1818, a seat for the Aberdeen district

of burghs, comprehending his native town of Montrose. In 1830 he had gained such distinction as a radical reformer, that he was returned without opposition as one of the members for Middlesex, which he represented until 1837. In 1842 he was again chosen for his native burgh, Montrose, and remained until his death in the service of his fellow-townsmen. Although by no means a man of brilliant abilities, his indefatigable industry in his parliamentary duties, his plans of reform in every department of church and state, his hatred of sinecures and official abuses of every kind, and his advocacy of economy in the public service, made him one of the most useful and influential members of the legislature. He was probably often wrong-headed and mistaken, and as the leader of the radical party in the house of commons, usually found himself in active conflict with both whig and tory governments. Yet a tardy but sincere homage was paid to his integrity and public services by the late sir Robert Peel, and other political opponents. He died Feb. 20, 1855, aged 78, leaving a name venerated by his fellow-countrymen for public honesty and personal disinterestedness.

HUMERUS, the largest and longest bone of the upper extremity. It is the one bone of the arm proper, that is, that portion between the shoulder and elbow. It is divided anatomically into a *shaft* and two *extremities*. The upper extremity is rather the largest, and has a semi-globular head which is received (partially, because the cavity is shallow) into the *glenoid* cavity of the scapula or shoulder blade, forming what is called a ball and socket joint. Two processes or projections of the shoulder blade assist the glenoid cavity in completing the cavity or seat of the head of the humerus. There are three ligaments which hold the humerus to the scapula: the capsular, the coraco-humeral, and the glenoid, the relations being somewhat similar to what obtain in the hip joint (q.v.). The shaft of the humerus is nearly cylindrical in its upper part, but triangularly prismatic below, becoming flattened and broad at the lower extremity, where are placed the two condyles, with their articular surfaces, and the trochlea between them, which form, with the two bones of the fore-arm, the elbow joint (see ARM and SKELETON). The broad, flat lower extremity has two depressions on the anterior aspect of the bone: one slight one on the outer side called the radial depression, which is for the reception of the anterior border of the head of the radius, when the arm is strongly flexed; the other, called the coronoid depression, for the reception of the coronoid process of the ulna during flexion of the arm. Opposite these depressions, on the posterior surface of the bone, is a deep triangular depression, called the olecranon fossa, for the reception of the important process of the ulna, called the olecranon process. The humerus forms with the scapula, as above-mentioned, a ball and socket joint, the shoulder joint (q.v.). The elbow joint is a hinge joint, and, to a certain extent, in its relation to the head of the radius, a ball and socket joint, and is one of the most beautiful pieces of mechanism which can be conceived, especially in man, where it exhibits indications of design having reference to man's intellectual functions.

HUMET'TY, a term in heraldry, applied to a cross or other ordinary which is cut off, and nowhere reaches the edge of the shield.

HUMIC ACID. See HUMUS.

HUMILIATI, a monastic order founded in 1134 by several Italian noblemen who had been sent as prisoners to Germany by Lothar II., and were released on account of their *humility*. In 1151 they were embraced under the rule of St. Benedict, and the order was confirmed by Innocent III. half a century later. They ultimately spread so widely as to have 98 houses under the jurisdiction of their order; but they were suppressed by Pius V. in 1576 on account of their luxury and cruelty. A female order of Benedictines, known as humiliate nuns, or nuns of Blassoni, from their foundress, served as nurses, etc. In 1571 they were suppressed by the pope on account of some disorders, but a few convents, greatly decayed, still exist in Italy.

HUMMEL, JOHANN NEPOMUK, an eminent pianist and composer, b. at Presburg in 1778. His earliest musical instructions were derived from his father, the director of the imperial school of military music; after which he went to Vienna, where Mozart, forming a high opinion of his talents, took him under his tuition. He appeared in public in 1787, being then but nine years of age, at a concert given by Mozart in Dresden; after which he gave concerts in Germany, Denmark, England, and Holland. In London, Hummel had the advantage of Clementi's instructions in 1791; and in Vienna, in 1793, he took lessons from Albrechtsberger, in composition, and from Salieri in dramatic writing. From 1803 to 1811, he held the post of kapellmeister to prince Nicholas Esterhazy; and he was at a later period kapellmeister at Stuttgart and Weimar. He visited Paris for the first time in 1822: and in 1833 became conductor of the German opera at the King's theater in London. He died at Weimar in 1837. Hummel's pianoforte works rank among the purest and most classical compositions for that instrument —his concertos are full of artistic skill; he has besides composed masses, which are in high esteem, and several now nearly forgotten operas and cantatas. His playing was characterized by the same solid qualities as appear in his compositions.

HUM'MELER, an implement or machine used for *hummeling* barley—that is, removing the awn from the grain after it has been thrashed. A common kind of hummeler is a set of blunt knives fixed in a frame, with a handle, by means of which they are

used in the manner of stamping. Another form consists of blunt knives set on a roller. These implements are worked by the hand. But hummelers of various construction are often attached to thrashing-machines, in all of which blunt knives are made to pass frequently through the grain.

HUMMING-BIRD, *Trochilus*, a Linnæan genus of birds, now constituting a family, *trochilidæ*, of the order *insessores*, and tribe *tenuirostres*. The species are numerous, more than 300 being known, whilst new ones are continually being discovered. They are found only in America and its islands, although represented, both in habits and in brilliancy of plumage, by the sun-birds (q.v.) of eastern tropical regions. Most of them are tropical, although a few species are summer visitants of the colder parts of America, very seldom, however, seen beyond lat. 57° n.; whilst some of those found only within the tropics inhabit elevated mountainous tracts, even to the confines of perpetual snow. The dazzling brilliancy of humming-birds, the extreme rapidity with which they dart through the air, their hovering above the flowers from which they obtain their food, with humming sound of wings which move so quickly as to be indistinctly visible, or "like a mist," have attracted universal admiration since the first discovery of America. The diminutive size of almost all of them—some of them being the smallest of birds, and if stripped of their feathers, not larger than a humble-bee—has still further contributed to render them objects of interest, whilst the plumage of the different species exhibits an almost endless variety of forms as well as of colors, in crests, neck-tufts, leg-tufts, and many an extraordinary development of tail.

Humming-birds have slender bills, which are also generally long, and in some extremely so, the form of the bill exhibiting a wonderful adaptation to the kind of flowers from which the bird obtains its food—straight in some, curved in others. Humming-birds do not, as was long supposed, feed on honey alone, but to a considerable extent, and some of them perhaps chiefly, on insects, not rejecting spiders, whilst they often snatch away the insects which have become entangled in spiders' webs. The lower mandible fits into the upper, and the bill is thus adapted as a tube for sucking, in which, as well as in seizing small insects within the recesses of flowers, the tongue is also a very efficient organ. The tongue is very long, capable of being darted out to a considerable length; the bone of the tongue (*hyoid bone*) being much elongated, and its branches passing round the back of the skull to the forehead, where they meet in a point before the line of the eyes. The tongue itself consists of two filaments, joined together for the greater part of their length, and separated at the tip. The wings of humming-birds are very long and powerful, the first quill-feather the longest, and the rest shorter in succession. Humming-birds construct their nests with nice art, generally of lichens and of fibrous substances, such as cotton. They do not lay more than two eggs. They are very bold in defense of their nests and young, and are said to strike fearlessly with their needle-like bills at the eyes of birds of prey, which they far surpass in agility and rapidity of flight. They are very easily tamed and rendered familiar, and have been known to return again in spring, after a winter migration to a warmer climate, to the window from which they had been allowed to escape. Attempts to keep tamed humming-birds have generally failed, perhaps on account of their being supposed capable of feeding only on honey or syrup, whereas insect food seems necessary for them. Attempts made to bring them across the Atlantic have, in the great majority of cases, been unsuccessful.

We cannot propose to describe any of the species of humming-bird, nor to give the characters of the numerous genera into which the family has been divided. Form alone without color is insufficient to convey a proper idea of their metallic and gem-like splendor, which in many cases varies with every change of position and of light.

The ruby-throated humming-bird (*trochilus colubris*) is the only species found in the northern Atlantic states of North America. It ventures even into the regions of the Hudson's bay company.

The skins of humming-birds were employed for ornamental purposes by the more civilized American races before the discovery of America by Europeans, and were used by the Mexicans for making those pictures which so much attracted the admiration of their Spanish conquerors.

One of the greatest authorities on the humming-bird is Gould, who has written a work upon the subject, magnificently illustrated.

HU'MORS. See MEDICINE.

HUMPBACK WHALE, one of the *balaenidæ*, or toothless whales, which includes the right or Greenland whale, the teeth being replaced by whalebone plates, whence they are also called *whalebone whales*. The humpback whale belongs to the genus *magaptera*. They have a hump on the back which is an adipose dorsal fin. They are very ferocious, and valued for their oil. See WHALE.

HUMPHREY, EDWARD PORTER, D.D., LL.D.; b. Conn., 1808; son of Heman; graduated at Amherst in 1832. He has been a Presbyterian pastor in Indiana and Kentucky; and professor of ecclesiastical history in Danville theological seminary.

HUMPHREY, HEMAN, D.D., 1779–1861; b. Conn.; graduated at Yale, and was pastor of a Congregational church in Fairfield for ten years; afterwards pastor in Pittsfield,

Mass. In 1823 he was chosen president of Amherst college, over which he presided until 1845, after which he turned his attention to authorship. He was an early advocate of temperance, and a report of his on the subject made in 1813 is said to have been the first temperance tract. Among his publications there are, besides biographies, *The Sabbath; Tour in France, Great Britain and Belgium; Domestic Education;* and *Revival Sketches.*

HUMPHREY, ZEPHANIAH MOORE, D.D., b. Mass., 1824; graduated at Amherst and in theology at Andover in 1849. He has had pastoral charge in Milwaukee, Chicago, and Philadelphia; he was a leading member of the last general assembly of the new school branch of the Presbyterian church, his brother being at the same time a prominent member of the old school assembly, an took an influential part in the consummation of the reunion of the two branches; and in 1871 he was moderator of the reunited assembly. In 1875 he became professor of church history in Lane theological seminary, at Cincinnati, Ohio.

HUMPHREYS, a co. in middle Tennessee crossed by the Nashville, Chattanooga, and St. Louis railroad, bounded w. by the Tennessee river; 400 sq.m.; pop. '70, 9,326—1295 colored. It has a hilly surface largely covered with forests. Corn is the chief crop. Iron is found. Co. seat, Waverly.

HUMPHREYS, ANDREW ATKINSON, b. Philadelphia, 1810; graduated at West Point and served in the U. S. army until 1836. He then resigned from the army, but in 1838 rejoined it and was assigned to the topographical department, with the direction of the coast survey office. He was also engaged in the Pacific railroad survey. In the war of the rebellion he was on McClellan's staff, and afterwards was Meade's chief of staff. He saw much active service at Fredericksburg, Chancellorsville, and Gettysburg. In 1866 he was appointed chief of engineers of the U. S. army with the rank of brig.gen.

HUMPHREYS, DAVID, LL.D., 1752–1818; b. Conn.; graduated at Yale; a captain in the revolutionary war, and aid to Washington. In 1780 he went to France with Jefferson as secretary of legation; afterwards to Lisbon, and in 1797 to Spain as ambassador. In the war of 1812 he was an officer of militia. He was one of the writers of the *Anarchiad*, a satirical work in verse published soon after the revolution. He also wrote a life of Putnam.

HU'MUS is a generic term applied to a group of closely allied substances, which collectively form the organic matter of the soil. These substances may be divided into three great classes: 1. Such as are soluble in water—crenic, apocrenic, and ulmic acids; 2. Such as are soluble in alkaline solutions, but not in pure water—humic and geic acids; 3. Such as are insoluble in all menstrua—humin and ulmin.

All of these are amorphous, ranging in color from a brownish yellow to a blackish brown; and non-volatile; they are probably all composed of carbon, hydrogen, and oxygen, and they are all remarkable for their power of fixing ammonia. "They are all products of the decomposition of vegetable matters in the soil, and are formed during their decay by a succession of changes, which may be easily traced by observing the course of events, when a piece of wood, or any other vegetable substance, is exposed for a length of time to air and moisture. It is then found gradually to disintegrate with the evolution of carbonic acid, acquiring first a brown, and finally a black color. At one particular stage of the process, it is converted into one or other of two substances, called humin and ulmin, both insoluble in alkalies, and apparently identical with the insoluble humus of the soil; but when the decomposition is more advanced, the products become soluble in alkalies, and then contain humic, ulmic, and geic acids; and finally, by a still further progress, crenic and apocrenic acids are formed, as the result of an oxidation occurring at certain periods of the decay."—Anderson's *Agricultural Chemistry*, 1860, p. 22.

The roots and other vegetable matters remaining in the soil gradually undergo the changes which have been described in the preceding extract, and are thus converted into humus, which is found only in the surface soil, in which its quantity varies with the activity and profusion of the vegetation.

Numerous analyses of the humus compounds have been made, but, as might be expected from the gradual passage of one substance into another, they present considerable discrepancies. According to Mulder, who is perhaps the highest authority on this subject, geic acid is represented by $C_{40}H_{12}O_{14}$; humic acid, by $C_{40}H_{12}O_{12}$; ulmic acid, by $C_{40}H_{14}O_{12}$; crenic acid, by $3HO,C_{24}H_{12}O_{16}$; apocrenic acid, by $2HO,C_{48}H_{12}O_{24}$. Crenic and apocrenic acids (which derive their names from *crenē*, the Greek word for *a spring*) not only occur in combination with ammonia, in the organic matter of the soil, but are likewise found in many mineral waters, and in the ochry deposits that accumulate round the margins of chalybeate springs.

All the above-named substances closely resemble in their composition the woody fiber or cellulose ($C_{24}H_{21}O_{21}$), from which they are derived by a slow process of oxidation.

Chemists hold very different opinions regarding the physiological value of humus The earlier chemists, and Mulder at the present day, regard it as the almost (if not quite) exclusive source of the organic constituents of plants; while Liebeg and the great majority of the chemists of the present day regard the atmosphere (which consists of a mixture

of nitrogen and oxygen gases, watery vapor, carbonic and nitric acids, and ammonia) as capable of affording an abundant supply of all these substances. The latter is probably the more correct view; but although humus is not a direct source of the organic constituents of plants, and is not absorbed by their roots, as was formerly supposed, it is so indirectly in at least two modes—viz., by evolving during its decomposition a certain quantity of carbonic acid which can be absorbed, and by its power of absorbing and combining with ammonia and with certain soluble inorganic constituents of plants. Its power of absorbing ammonia is readily shown by pouring some ammoniacal solution on peat (which contains the humus compounds in great abundance); the pungent smell at once disappears, which is an evidence that combination has taken place. It possesses a similar but less marked power in reference to potash, soda, lime, and magnesia, and thus plays an important part in preventing these substances from being washed out of the soil. The physical properties of humus are also of great importance in relation to the fertility of the soil. Humus is one of the most highly hygrometical substances known. While siliceous sand absorbs only one-fourth of its weight of water, and again gives off, in the course of four hours, four-fifths of its water, humus imbibes nearly twice its weight of water, and retains nine-tenths of it after four hours' exposure. It thus confers on the soil the power of absorbing and retaining water, and thus diminishes its tenacity, and allows of its being more easily worked; and additionally, from its dark color, it causes the more rapid absorption of heat from the sun's rays. Hence, although not contributing directly to the food of plants, it is in moderate quantity an indispensable constituent of a fertile soil. The best wheat-bearing soils contain 9 or 10 per cent of humus compound.

HUMU'YA, a river in Honduras, which with the Santiago and Blanco forms the Ulua. The Humuya has a course of 100 m.; is rapid and navigable only for canoes. It passes by the city of Comayagua, the capital of Honduras, and its chief interest exists in its possible connection with an interoceanic canal.

HU'NAN, a province in the lake district of China, on the s. side of Tung-ting-hu, the largest lake in China. It is a fertile region, yielding two crops of rice annually, while its mountains yield malachite, iron, lead, and coal. Area, 74,320 sq.m.; pop. 18,652,507. Its capital is Chang-sha-fu, situated on the river Siang.

HUNDRED, in English law, an ancient subdivision of counties, the origin of which is not very clearly settled, though probably the name arose from there being a hundred sureties in each to keep the peace. In ancient times, if a crime was committed, such as robbery, maiming of cattle, burning of stacks, etc., the hundred had to make it good. The old distinctions have, however, now less significance. But the characteristic of a hundred is still this, that it has a constable or bailiff, and when any damage is done by rioters feloniously destroying property, the individual owner has his remedy by suing the hundred for the damage. In order to secure this remedy, the party or his servant must, within seven days, go before a justice, and state on oath the names of the offenders, and engage to prosecute them. So, where there is no hundred, the county or city, or town is liable in like manner, and in all cases the expenses are paid by the county rate, or a rate in the nature of a county rate. In the northern counties, a hundred is generally called a wapentake. The act 7 and 8 Geo. IV. c. 31, giving the above remedy against the hundred, does not extend to Scotland. See RIOT.

HUN'DREDERS, inhabitants of a hundred (q.v.).

HUNFALVY, JÁNOS, b. Hungary, 1820; professor of statistics in the academy at Käsmark; took part in the revolution of 1848; and five years later became professor of history in the polytechnic school at Buda. He has published *Universal History; Physical Geography of Hungary; Hungary and Transylvania* and some other books.

HUNFALVY, PÁL, b. Hungary, 1810; a member of the diet, professor of jurisprudence in the academy at Käsmark, and a philologist. He has written works upon languages, particularly concerning the origin of the Hungarian tongue.

HUNGARIAN GRASS, a hardy annual, a variety of millet. It grows luxuriantly in almost any soil, and is highly esteemed for forage, being greatly relished by horses and cattle.

HUNGARIAN LANGUAGE AND LITERATURE (HUNGARY, *ante*). The origin of the language is involved in obscurity, but its vitality is remarkable. It was no doubt spoken and written by some of the tribes in middle Asia at a very early period. It is now accommodated to the Latin alphabet, and consists of 26 simple and 6 compound sounds. Whatever changes it has undergone, it yet retains all its essential features. It indeed embodies many foreign words, but it has assimilated them in accordance with its own fundamental laws. Its system of suffixes gives it great plasticity, enabling it to meet in the readiest way difficulties that other languages can only overcome in a very awkward fashion. It is capable of expressing with ease and fidelity every shade of meaning conveyed in other tongues. The literature of Hungary is of comparatively recent date, its growth having been checked by the introduction of Latin as the language of priests and teachers as well as of the court under Stephen I., who introduced the Roman religion and reigned from 997 to 1038. The remnants of Hungarian writing from this time till the Protestant reformation are very scanty. This great movement promoted the cultivation of the native tongue, but the German element coming in with

the Hapsburgs offered a new check to the development of the national literature. In the 16th c., parts of the Bible were translated into Magyar, and distinguished orators and poets made the language the vehicle of their appeals to the national feeling. In the 17th c. the entire Bible was translated into Magyar, the Hungarian muse found new votaries, and eminent orators arose to stir the hearts of the people by addressing them in their native tongue. But the influence of the German dynasty arrested the national movement, and Latin again predominated. Near the close of the last c. there was a reaction, and societies for the cultivation of the Magyar tongue were formed, and various periodicals founded in the same interest. The new movement, identical as it was with the regeneration of the nation, was successful; and within the first 25 years of the present c. all foreign elements gave way before it. The credit of this is largely due to Francis Kazinczy, the great linguistic reformer, and the poets Csokonsi, Dayka, Verseghy, Alexander, and Virág. The golden age of Hungarian literature was the 30 years preceding the revolution of 1848–49. Charles Kisfaludy, brother of Alexander, created the Hungarian drama by his tragedies and comedies. Kölesey by his logical poems, ballads, prose writings, and orations, exerted a potent influence upon the patriotism of the nation, Fay's fables, and Czuczor's and Vörösmarty's popular epics also did much to evoke and foster a true national feeling. Bajza was not only an eminent lyrical poet, but a historical writer and æsthetical critic. Jósika and Eötvös, eminent in the field of historical faction, exercised a large influence. Belenyei, Császàr, Bartholomew Szemere, and others wrote books of travel. As political writers Szezhenyi, Kossuth, Eötvös, and others took high rank; while in the field of history Horváth, Péczely, Jászay, and Bajza did excellent work. Szontágh, Márki, Gregus, and others wrote historical treatises; while the natural sciences, theology, languages, and antiquities did not lack for exponents. The revolution of 1848–49 doomed many gifted writers to the dungeon, the scaffold, or exile, and the literature of the last 30 years is not on the whole equal to that of the preceding period. The restoration of the Hungarian constitution has, however, brightened the literary prospects of the country.

HUNGARIAN WINES (HUNGARY, *ante*). See GERMAN WINES.

HUNGARY (Ger. *Ungarn;* Magyar, *Ország* (land of the Magyars), a portion of the Austro-Hungarian empire. According to the fundamental laws of the realm, the emperors of Austria are kings of Hungary, which formerly comprehended Hungary proper, Croatia, Slavonia, Dalmatia, the Illyrian sea coast, Transylvania, and the whole of the military frontier. After 1848 these pendicles were dissociated administratively from Hungary proper and converted into crown lands. Since 1867 Hungary, Croatia, Slavonia, Transylvania, and the military frontiers, have constituted the kingdom of Hungary, one member of the bipartite empire. The two knots which tie Austria proper and Hungary together are the person of their common sovereign and the "delegations"—a parliament consisting of 120 members, of which 60 are supplied by either portion of the empire. This body legislates for war, finance, and foreign affairs; and the ministers of these three departments are responsible to it, or to a committee of its members. Hungary has an area of 124,560 English sq.m., and a population (1870) of 15,509,455; (1876) 15,784,500. The general features of the country are given under the article Austro-Hungary (q.v.), to which may be added that the soil of the vast plains consist chiefly of humus and clay, and is of great fertility. Huge tracts of sand are to be found in several parts; there are also swamps all along the Theiss. The level tracts in the eastern part of Hungary are subjected to periodical drought, and to frequently recurring blasts. The heat is sometimes so great, that it is impossible to walk with bare feet on the burning sand. Autumn and winter are of short duration. In spring, great part of the level land becomes an almost impassable ocean of mud. Hail-storms during summer, and the severity of cold during winter, cause much anxiety to farmers, and more especially to the numerous class of vine-growers. Ague is common in some regions, but the climate is healthful upon the whole.

Hungary is an agricultural country in the main, though the methods of cultivation are exceedingly defective. In many places the ground is not even manured. In Hungary proper, exclusive of Transylvania, Croatia, and Slavonia, about one-twelfth of the whole soil is unproductive, one-third is arable land, one-fourth is wooded, one-fourth in pasture, one-seventy-first devoted to the culture of the vine. Magnificent forests clothe all the hilly regions; yet in the low country wood is so scarce that dung has to be used for fuel. Grain is produced in abundance, and beyond what is needed for home consumption. The order of importance of the various kinds is oats (of which one-third is exported), barley, rye, maize, and wheat. Vast quantities of hemp and flax are raised. For more than 150 years tobacco has been raised in Hungary. Large quantities are still grown, the sale of it being, however, a government monopoly. Potatoes are little used for food save by Germans, but are available for making spirits. The culture of fruit is almost wholly left to the Germans, and is most productive in their hands; the fine climate brings, for example, no less than 50 kinds of peaches to perfection. In many parts of Hungary, figs, almonds, and even olives thrive. Wine is one of the most important sources of Hungarian comfort and wealth. France alone excels Hungary in the quantity of wine produced; the total production is estimated at 400,000,000 gallons, and could be much

increased. But the system of culture, and the methods used in preparing the wine are so primitive and imperfect, that not over 50,000,000 can be made fit for export. The wine of Hungary was used in England in the days of James I. The finest Hungarian wines are the yellowish brown Tokay (to the production of which upwards of 100 sq. m. of land are devoted), a dark red wine called Menes, and the well-known Ruster dessert-wine. Cattle-breeding is a great source of trade. Of large cattle Hungary possesses over three and a half millions; of sheep, twelve and a half; and swine innumerable. The number of geese and ducks may be inferred from an annual export of 150 tons of feathers. Horses are carefully reared in Hungary; there are nearly two millions of them in the land. No country of Europe has greater attractions than Hungary for the sportsman; the chamois, bears, and wild boars are still found. Red deer abound, as do fowls and fish of all descriptions. In its minerals Hungary has vast sources of wealth. Russia alone surpasses Hungary for its richness in the noble metals; very considerable quantities of gold and silver, generally mingled, being found. Copper and iron are largely produced. Antimony, cobalt, and arsenic are wrought, as are salt, soda, natural saltpeter, and alum. Opals and amber occasionally appear; marble and alabaster, coal, pitch, and graphite are available in various districts. In regard to its industry, Hungary is yet far behind; a little of the commoner kinds of linen and woolen cloths, leather, sugar, glass, paper, and spirits are its chief manufactures. The trade in grain, flour, sheep, wool, and skins is brisk. Of the total population, upwards of 5,000,000 are engaged in agriculture and mining, 65,000 in industrial work, 134,000 in trade, and nearly 180,000 follow professional pursuits. Hungary has few good roads; the rivers, especially the Danube, are the great channels of communication. About 2,700 m. of railway are in operation. Besides the capital, which has a population of over 200,000, there are in Hungary four cities of 50,000 inhabitants and upwards, and three others above 40,000. In educational affairs Hungary has till of late been very backward. In 1871, out of 2,206,187 children of sufficient age, 1,253,500 were at school; 47 per cent of the men and 55 per cent of the women in Hungary can neither read nor write. Yet the educational apparatus of Hungary is on a liberal scale. The university of Buda-Pest has 52 ordinary and 15 extraordinary professors, 38 *privat-docents*, and nearly 2,500 students. The polytechnic school there has about 50 teachers. Since 1872 there is also a university in Klausenburg. There are theological seminaries for all the various confessions, and of late great efforts, not without good result, have been made to raise the educational status of the country; insomuch that the annual expenditure on education rose from 981,000 florins in 1868 to 2,764,000 florins in 1872. In 1871 and 1872 there were 900 new schools opened, and 1002 new school-houses erected. Besides 14,000 primary schools, there are now in Hungary and Transylvania about 180 gymnasia; and academies, learned societies, and associations for the promotion of Hungarian literature exist. Newspapers and periodicals to the number of 205 appear regularly; of these more than half are Magyar, about 30 are Slavic, one-fourth are German, and two or three Rumanian.

In no other European country is there such a mixture of races differing in blood, speech, and manners. In Hungary proper about 50 per cent of the whole population is Magyar; Slavic (including Slovaks, Ruthenians, Croats, and Serbs), 32 per cent; German, 14.3; Rumanian, 11; Jew, 1½; Gipsy, ½. In Transylvania the number of various elements is as great, Roumanians forming here three-fifths of the whole, and the Magyars being about half as many. In Croatia and Slavonia naturally Slavs have the predominance; 98 per cent of the whole being Croat or Serb. The town of Fiume, which has since 1870 been attached to Hungary, is quite German in character. In 1869 the population of Hungary in the wide sense contained 9,163,319 Roman Catholics (7,500,000 being of the Latin ritual, the others united Greek and Armenian); 3,144,751 Protestants (Calvinist and Lutheran); and 2,589,319 of the Greek church; besides Unitarians (55,000), Jews (553,000), and heathens (223). The divisions of race coincide to a large extent with religious distinctions. All Hungarians, Germans, and Slovaks, as also the Croats in Hungary are either Catholic or Protestant; Rumanians, Ruthenians, and Serbs are either united or orthodox Greeks. In Hungary, Transylvania, Croatia, and Slavonia, the Catholic church has 4 archbishops and 20 bishops; 203 monasteries with 2,417 inhabitants, and 80 nunneries with 1136 nuns. The Greek Catholics are under an archbishop and 6 bishops, and have 9 monasteries. The orthodox Greeks have 2 archbishops and 7 bishops, and have 3 monasteries. The Lutherans and Calvinists have each 5 superintendents or overseers of ecclesiastical districts. The Unitarians have but one.

History.—The Hungarians—in their own language, Magyars—are sprung from that group of Tartaric races to which the Turks also belong (see TURANIAN LANGUAGES); their ancient seats being in central Asia. Part of the people emigrated in the direction of the Ural mountains, and thence, being pressed by the warlike swarms of Paimacitae, to the regions now known as Moldavia and the Ukraine. In 889, 40,000 families, counting more than 200,000 warriors among them, left their homes under the leadership of Almos, and after many a hard battle arrived at the north-eastern frontiers of the land, which, under the name of Pannonia, contained several independent realms, such as Great Moravia, the Slavo-Bulgarian kingdom of Zalan, etc. The great task of conquest being now at hand, old Almos resigned, and his son Arpád being unanimously elected

as chief, the armed invasion began at once in several directions. At the end of 899 Arpád's sway extended from the Carpathians down to Servia, and from the eastern borders of Transylvania to the foot of the Styrian mountains. According to a covenant between Arpád and the other chiefs, the leadership was to remain with the descendants of the former as long as they should keep faithful to the nation. The foundations which were then laid for the political organization of the realm have been developed through lapse of time into that system of municipal independence which has outlived the storms of nearly a thousand years, and contains, even after the disastrous issue of 1849, the germs of future national greatness. The periods into which the history of Hungary is divided are: 1. Period of chiefs of the house of Arpád (894–1000); 2. Period of kings of the house of Arpád (1000–1301); 3. Period of kings from different (foreign) families (1301–1526); 4. Period of kings of the house of Hapsburg (1526 to the present day). The first king of Hungary was Stephen I., called the saint; he was crowned in the year 1000 with a crown that had been sent to him by the pope, Sylvester II. It forms to-day the upper part of "the sacred crown of Hungary."

With St. Stephen a new era began for Hungary; Christianity took the place of heathen superstitions; the savage incursions, by which *the people of the east* became a scourge to neighboring nations, ceased entirely. The house of Arpád gave 20 kings to Hungary, the greatest of whom undoubtedly was Stephen I., who, besides dividing the realm into 10 bishoprics, more completely developed the administrative system. Among his successors, Béla I. (1061–63) distinguished himself by saving the hardly begun Christian civilization against the rebellious attempt of a numerous party. Ladislaus I. is renowned for wise legislation and for great personal valor. Such was the renown of his deeds, that at the council of Piacenza (1095) he was unanimously elected to be the leader of the crusade to Palestine. Death prevented the hero from accomplishing the task. Coloman (1095–1114) went by the name of "Learned," and many of his laws show how much he was in advance of the age. Gejza (1141–61) was but 10 years old when crowned; nevertheless, his reign is worthy of mention, for it was then that colonists from Flanders settled in northern Hungary, as also in Transylvania, in consequence of which, mining and several branches of industry made rapid progress. Andrew II. (1205–35) is known in connection with the crusades; the Hungarian magna charta (bulla aurea), forced from him by his nobles, dates from 1222. Béla IV. (1235–70) showed great qualities in subduing the indomitable arrogance of the oligarchy, and in healing the wounds of his people after the terrible invasion of the Mongols in 1242. Andrew III. was the last male scion in the Arpád line; he died without issue in 1301. During the mixed period, two kings, besides the governor Hunyady (q.v.), especially distinguished themselves. Lewis I., called the great (1342–81), was the second king from the house of Anjou, being by his great-grandmother connected with the Arpád dynasty. Lewis extended the sway of the Hungarian scepter to limits formerly unknown; re established at home the authority of law, trodden down by the mighty oligarchs under his predecessors; and promoted science, industry, and commerce. One of the remarkable episodes of his reign was the expedition to Italy to punish the assassins of his unfortunate brother, Andrew, spouse of the famous Joan of Naples. Sigismund (1387–1437) is better known as emperor of Germany. As a curious incident in the life of a sovereign may be mentioned his imprisonment at Siklós during six months. Sigismund was released only after he had taken the oath to his Hungarian subjects, vowing fidelity to the constitution. Mathias I.—better known by the name of Mathias Hunyady or Mathias Corvinus (see MATHIAS)—may be said to have been not only the greatest king of Hungary, but also the greatest sovereign of his age. By his valor, sagacity, and love of learning, he raised his nation to the pinnacle of fame. From the death of Mathias to the day of Mohács, Hungary exhibits the fiercest strife of factions—a protracted agony, preceding the loss of national independence. Among the many calamities during the reign of Vladislas II. of Bohemia (1490–1516), the peasant war occupies a prominent place. Dózsa and his bands, after having committed great havoc, were exterminated by the famous John Zapolya of Transylvania, *and the whole of the peasantry reduced to a state of serfdom.* Lewis II. was but 10 years old at the death of his father, Vladislas II. Another 10 years of rapid disorganization was required to make a disaster like that of Mohács possible. See MOHÁCS, BATTLE OF. The further history of Hungary is indissolubly connected with that of the Austrian empire, and may be read as to its principal features under the head AUSTRIA.

Fundamental Laws of Hungary.—1. The golden bull of Andrew II., given in the year 1222, upon the return of the king from Palestine, contains 31 articles, of which article 2 is a kind of habeas corpus act, but for nobles only. One clause of article 31, declaring armed resistance to any illegal acts of the king not punishable by law, was canceled by article 4 of the diet in 1687.

2. Treaty of peace of Vienna, 1606. It was concluded on June 23, between Mathias II. and Stephen Boeskay. Article 1 enacts freedom of worship to Protestants, as far as is consistent with the established rights of the Roman Catholic church.

3. Treaty of peace of Linz, enacted during the diet of 1646–47. Public worship is once more secured to Protestants, such freedom being for the first time extended also to the peasants. Protestants were to be admitted to public functions on an equal footing with Catholics.

4. The pragmatic sanction, contained in article 2 of the diet of 1722–23. In case there should be no male issue in the dynasty of Hapsburg, the females and their descendants are to succeed to the Hungarian throne. The king must be a Roman Catholic, must take oath to the constitution, and sign the so-called *diploma inaugurale*, thus confirming the rights and privileges of the nation. Should there be no descendant, male or female, of the reigning house, the freedom of electing their king belongs to the nation.

Article 11 of 1741. Maria Theresa, abandoned by her allies, surrounded on all sides by fearful dangers, won the love of the Hungarian nation by acceding to their just and legitimate claims. The government of Hungary was confided to Hungarians only; in public affairs, the primate, the palatine, and the ban were to be consulted. Hungarians were to be eligible for seats in the ministry. Article 17 of 1790–91 renews those enactments.

Article 10 of 1790–91 establishes the independence of the Hungarian kingdom with its annexed parts. *Article* 12 *of the same year declares that the power of making, changing, and interpreting laws in the kingdom of Hungary belongs to the sovereign legitimately crowned, together with the diet legally convened. Nothing can be done in Hungary by means of royal letters-patent.* Article 13 orders that the diet shall be convoked at least once every three years.

Article 16 guarantees the nation the use and culture of the Magyar tongue.

Article 19 secures to the diet the right of voting taxes and of fixing the number of recruits.

Up to the year 1848 the nobles were free from contribution and military service; they occasionally gave subsidies; and in case of extreme necessity, rose in arms for the defense of the country. Article 8 of 1847–48 enacts the great principle that all classes are to participate in the public burdens of the realm. Article 9 abolishes statute labor; the peasant could henceforward become owner of real property; and indemnity was given to their former masters. Article 5 of 1847–48 establishes the principle of popular representation upon the basis of taxation.

In 1860 the decree of 1849, declaring that Hungary had by the rebellion forfeited its national constitution, was formally repealed, and the old constitutional system was restored. And in June, 1867, the emperor of Austria solemnly swore to maintain the constitution, and was crowned king of Hungary.

The Hungarian reichstag or diet consists of the house of magnates and the house of representatives. In 1879 the former counted nearly 800 members. Of the 444 members of the latter, 384 represent Hungary proper, 1 Fiume, 75 Transylvania, and 34 Croatia and Slavonia. The lower house is composed of representatives of the towns and rural districts. It is elected by the votes of all citizens of age who pay direct taxes to the amount of 16s. a year. Neither electors nor their representatives are affected by any distinction of race or religion.

Hungarian Language and Literature.—Notwithstanding the general sympathy that prevails for Hungary, many are of opinion either that the Hungarians are but a half-civilized people, or that their language and literature are in some sense or another Germanic or Slavonic. The Magyar tongue is as much distinct from German or Slave as is the French or Italian. The language of the Hungarians is called Magyar, and forms, together with the Mogul, the group Ugri, belonging to the great Finnic family. As to its syntax, the language is nearest to the Turkish. Among its characteristics may be noted that the Christian name occupies always the second place, as, for instance, Hunyady János = John Hunyady. How rich in expressions, how abundant in classic beauties that language is, may be collected from the circumstance that although it was excluded from public life during 8 centuries (Latin being used in schools, legislation, and administration), Hungary possesses to-day a literature which, both in regard to its quantity and quality, will sustain a comparison with that of the most civilized among the western nations. Especially as regards poetry, the names of Kisfaludy, Vorösmasty, Petöfi, Arany, etc., are well worthy of being ranked with the best in other lands. Those who are desirous of further information on this interesting subject should consult Toldy's admirable *Handbook of Hungarian Literature*, published both in Magyar and German.

HUNGARY-WATER, a very celebrated perfume, for the preparation of which various receipts have been given. The following is one of the best: Take of fresh rosemary in blossom, 4 lbs.; fresh sage in blossom, 6 oz.; ginger in slices, 2 oz.; cut them in small pieces, mix, and add rectified spirit 12 lbs., and common water 2 pints. Let 11 pints distil by a gentle heat. A hermit is said to have given the original receipt to a queen of Hungary, and hence it was called the *Queen of Hungary's Water*, which has been abbreviated into Hungary water. It is employed principally as a perfume for the toilet; but it is sometimes taken internally as a restorative and stimulant, and it may be used externally as a gently stimulating liniment.

HUNGER. See DIGESTION.

HÜNINGEN (French, *Huningue*), a small t. in the s. of Alsace, is situated on the left bank of the Rhine, 37 m. s.s.e. of the town of Colmar. Pop. '71, 1456.

This place, still remarkable for its pisciculture, was formerly the center of the French

system. A series of buildings and artificial ponds, covering a space of 70 imperial acres, was erected in 1852–54 for the breeding and acclimatizing of foreign fish. The total cost was £10,607. The expense of carrying on the plan from 1853 to 1862 amounted to £13,887, and the annual cost after the latter year averaged about £2,000. This establishment enabled the French government during the second empire to restock many of the barren rivers of France with valuable fish. See PISCICULTURE.

HUNS (Lat. *Hunni;* Gr. *Ounnoi* and *Chounoi*), the name of a considerable nation of antiquity, which, from time to time, made incursions upon the Roman dominions, and which eventually, under Attila, the most renowned of its leaders, brought the empires of both the east and the west to the very verge of destruction.

The Huns were of Asiatic origin, and, in all probability, of the Mongolian or Tartar stock; therefore akin to, and perhaps to be identified with, the Scythians and Turks. According to De Guignes, whose theory has been accepted by Gibbon, the Huns who invaded the Roman empire were lineally descended from the Hiong-nou, whose ancient seat was an extensive but barren tract of country immediately to the n. of the great wall of China. About the year 200 B.C., these people overran the Chinese empire, defeated the Chinese armies in numerous engagements, and even drove the emperor Kao-ti himself to an ignominious capitulation and treaty. During the reign of Vou-ti (141–87 B.C.), the power of the Huns was very much broken. Eventually, they separated into two distinct camps, one of which, amounting to about 50,000 families, went southwards, while the other endeavored to maintain itself in its original seat. This, however, it was very difficult for them to do; and eventually the most warlike and enterprising went w. and n.w. in search of new homes. Of those that went n.w., a large number established themselves for a while on the banks of the Volga. Then crossing this river, they advanced into the territories of the Alani, a pastoral people dwelling between the Volga and the Don. At what period this took place is uncertain, but probably it was early in the 4th century.' The Alani, who had long dwelt in these plains, resisted the incursions of the Huns with much bravery and some effect, until at length a bloody and decisive battle was fought on the banks of the Don, in which the Alan king was slain, and his army utterly routed; the vast majority of the survivors joined the invaders.

The Huns are described as being of a dark complexion, almost black; deformed in their appearance, of uncouth gesture and shrill voice. "They were distinguished," says Gibbon, "from the rest of the human species by their broad shoulders, flat noses, and small black eyes deeply buried in the head; and as they were almost destitute of beards, they never enjoyed either the manly graces of youth, or the venerable aspect of age. A fabulous origin was assigned worthy of their form and manners—that the witches of Scythia, who for their foul and deadly practices had been driven from society, had copulated in the desert with infernal spirits; and that the Huns were the offspring of this execrable conjunction." Such was the origin assigned to them by their enemies the Goths, whom the Huns now invaded with fire and sword. Hermanric, the aged sovereign of the Goths, whose dominions reached from the Baltic to the Euxine, roused himself to meet the invaders, but in vain. His successor, Withimir, encountered the Huns in a pitched battle, in which he was himself slain, and his countrymen utterly routed. These now threw themselves upon the protection of the emperor Valens, who in 376 gave permission to a great number of them to cross the Danube and settle in the countries on the other side as auxiliaries to the Roman arms against further invasion. The Huns now occupied all the territories that had been abandoned by the Goths; and when these, not long afterwards, revolted against Valens, the Huns also crossed the Danube, and joined their arms to those of the Goths in hostilities against the Roman empire. In the wars that followed, the Huns were not so conspicuous as the Goths, their former enemies. Indeed, we now hear but little of the Huns during the remainder of the 4th century. It is supposed, however, that early in the following century they were joined by fresh hordes of their brethren, a circumstance which encouraged them to press onward towards further conquests. In the reign of Theodosius the younger, they had increased so considerably in power, that their sovereign Rugilas, or Roas, was paid an annual tribute to secure the Roman empire from further injury.

Rugilas, dying in the year 434, was succeeded in the sovereignty of the Huns by his nephews Attila (q.v.) and Bleda. With Attila's death, however, in 454, the power of the Huns was broken in pieces. A few feeble sovereigns succeeded to him, but there was strife now everywhere among the several nations that had owned the firm sway of Attila, and the Huns especially never regained their power. Many of them took service in the armies of the Romans, and others again joined fresh hordes of invaders from the n. and e., aiding them in their repeated attacks upon the moribund Roman empire.

HUNT, a co. in n.e. Texas, on Sabine river; 850 sq.m.; pop. '80, 17,229—1214 colored. The surface is hilly and well wooded; chief productions: cotton, corn, and pork. Co. seat, Greenville.

HUNT, HELEN. See JACKSON, HELEN HUNT.

HUNT, HENRY, 1773–1835; b. England; a friend of Cobbett, Horne Tooke, and similar reformers; presided over a reform meeting in Manchester in 1819, on which occasion the military interfered and many persons were killed. Hunt was imprisoned,

and on his release nearly three years afterwards, became a hero-martyr, made showy parades, and in 1830 was elected to parliament, defeating the earl of Derby. He devoted much of his life to forwarding the interests of the reform bill, whose passage he was fortunate enough to witness.

HUNT, HENRY JACKSON, b. Mich., 1819; graduated at West Point; served in the war with Mexico in many actions, and until its conclusion. In the war of the rebellion he was on McClellan's staff, was commander in-chief of the artillery of the army of the Potomac, and at the end of the war held the rank of maj.gen. of volunteers. He has published papers on artillery, on projectiles, on army organization, etc., and was made president of the permanent artillery board of the army.

HUNT, JAMES HENRY LEIGH, poet and essayist, was b. in London, Oct. 19, 1784, educated at Christ's hospital, and first attracted notice as a writer of theatrical and literary criticisms for the *Examiner* newspaper, which was started in 1805 by his elder brother John. At the age of 24 he became joint editor and proprietor of the *Examiner*. He was a liberal in politics before liberalism had become fashionable; and for one of his articles, reflecting on the obesity of the prince regent—"a fat Adonis of fifty," Hunt had called him—he was sentenced to pay a fine of £500, and to undergo two years' imprisonment. Hunt was happy enough in his confinement; he hid the prison bars with flowers, and received visits from Byron, Shelley, and Keats. On his release he published *The Story of Rimini*, which he had written in prison, and which gave him a place among the poets of the day. *Foliage* appeared in 1818, and about the same time he started the *Indicator*, a serial suggested by the *Spectator* and *Tatler*. In 1828 he published *Lord Byron and his Contemporaries*, the record of a brief and not very pleasant companionship in Italy with his lordship, which gave great offense to Byron's friends. In the same year he started *The Companion*, a sequel to *The Indicator*, both of which were republished as one book in 1834. In 1833 he published a collected edition of his poetical works. In 1834 he started the *London Journal*, which he edited for two years. His principal works, besides those already mentioned, are: *Captain Sword and Captain Pen* (1835); *Legend of Florence* (1840); *The Seer*, a publication similar to *The Indicator; The Palfrey* (1842); *Sir Ralph Esher*, a novel (1844); *Imagination and Fancy* (1844); *Wit and Humor* (1846); *Stories of the Italian Poets, with Lives* (1846); *Men, Women, and Books* (1847); *A Jar of Honey from Mount Hybla* (1848); his *Autobiography* (1850); *The Religion of the Heart* (1853); and *The Old Court Suburb* (1855). In 1847 he received from the crown a pension of £200. He died at Highgate, Aug. 28, 1859. A selection from his *Letters and Correspondence* was published by his son, Mr. Thornton Hunt, in 1862.

Hunt's reputation rests upon his poems and essays. *The Story of Rimini* is, on the whole, perhaps the finest narrative which has appeared since Dryden, and his *Palfrey* is delightful from its good spirits and bright sunny glimpses of landscape and character. As an essayist, he is always cheerful and fanciful, and he looks determinedly at the bright side of things. The sky may be gloomy, but if there is a bit of blue in it, he, with an admirable practical philosophy, constantly turns his eye to *that*. He delights to wreath the porch of the human dwelling with roses and honeysuckles. Among his poems are to be found several translations, which are the best things of the kind we possess. He transports the wine of Greece and Italy to England, and its color and flavor are rather improved than otherwise by the voyage.

HUNT, JOHN, b. England, 1812; a Wesleyan missionary in the Fiji islands, where he labored many years. He translated the New Testament into the native tongue.

HUNT, RICHARD MORRIS, b. Vt., 1828; chose the profession of architect, and in 1843 went to Europe, and studied in Paris, Greece, Asia, and Egypt. In Paris he was employed on the work connecting the Tuileries with the Louvre. In 1855 he returned to his own country, and has been the architect of the capitol extension at Washington, the Lenox library and the *Tribune* building, New York, and other important structures.

HUNT, THOMAS STERRY, LL.D., PH.D.; b. Conn., 1825. In 1845 he became assistant to prof. Silliman in his chemical laboratory at Yale college, and in 1847 was appointed chemist and mineralogist to the geographical survey of Canada. He held this post for more than twenty-five years, resigning in 1872 to accept the chair of geology in the Massachusetts institute of technology. His earlier studies were directed especially to theoretical chemistry, developing a theory essentially his own, in which all chemical compounds are deduced from simple types represented by one or more molecules of water or of hydrogen. These views are maintained by him in a series of papers in the *American Journal of Science*, beginning in 1848. His researches into the chemical and mineral composition of rocks have probably been exceedingly thorough; while his investigations of the chemistry of mineral waters have led him to form a theory of their origin and formation, and their relations to the origin of rock masses, both crystalline and uncrystalline, and to lay the basis for a system of chemical geology. He has discussed the phenomena of volcanoes and igneous rocks, and has revived the theory that the source of these is to be sought in the chemical reaction set up in the sedimentary deposits of the crust of the earth, through the agency of internal heat; and has sought to harmonize the facts of dynamical geology with the notion of a solid globe, in oppo-

sition to that which holds to a globe with a liquid interior. His views on these and other kindred questions, are to be found in an essay on the *Chemistry of the Earth*, in the report of the Smithsonian institution for 1869, in his address as retiring president of the American association for the advancement of science, and in more recent papers. His contributions to American and European scientific societies and journals are very numerous; and a collection of many of them was published in 1874. He furnished many important articles in his specialty to Appleton's *American Cyclopedia*, and is a member of the leading societies of both continents. He has reported fully on the auriferous quartz belt of Nova Scotia.

HUNT, THORNTON, 1810–73, b. England; an art critic, son of Leigh Hunt; was educated as a painter, but preferred the profession of a writer, and took charge of the political department of the *Constitutional* as long as it existed, and was afterwards associated with the London *Spectator* (1840–60). He edited Leigh Hunt's autobiography, and was the author of a romance entitled *The Foster Brother*.

HUNT, WARD, LL.D., b. N. Y., 1810; graduated from Union college in 1828. In 1839 he was elected to the state assembly; in 1844 was chosen mayor of Utica, and in 1865 was elected judge of the court of appeals. In 1870 he was commissioner of appeals, and in 1873 was appointed a judge of the U. S. supreme court.

HUNT, WILLIAM, an eminent English painter in water-colors, was b. in London in 1790. He ranks very high in his profession, no less an authority than Mr. Ruskin pronouncing him to be among the greatest colorists of the English school. His subjects are very simple—"Peaches and Grapes," "Old Pollard," "Basket of Plums," "Roses," "Wild Flowers," "Trampers at Home," "A Farmhouse Beauty," "Fast Asleep," etc., but they are conceived in a finely poetical spirit, and present the perfection of finish. He died Feb., 1864.

HUNT, WILLIAM HOLMAN, a celebrated English painter of the present day, was b. in London in 1827, and exhibited his first picture, entitled "Hark!" in 1846. During the next few years, his reputation steadily advanced; but while the young artist was winning fame, he was at the same time becoming more and more dissatisfied with the principles and practices that ruled his art, and along with Millais, Rosetti, and other young painters who shared his convictions, he commenced a new style of treatment, known as the *Pre-Raphaelite*. This term was originated by Hunt and his friends, and was employed by them to indicate their predilection for the painters who lived before Raphael, such as Giotto and Fra-Angelico, but did not at all imply that they meant to take the productions of these masters as technical models. It was because of their truthfulness and earnest simplicity that they admired the fathers of Italian art. The first of Hunt's works that showed the new influence was his "Converted British Family sheltering a Christian Missionary from the Persecution of the Druids" (1850). He afterwards produced, among others, "Valentine rescuing Sylvia from Proteus," "The Hireling Shepherd," "Our English Coasts," "London Bridge on the night of the Marriage of the Prince of Wales," "The After-Glow," "The Festival of St. Swithin," "The Awakened Conscience," "The Light of the World," "The Scape Goat," "Christ disputing with the Doctors in the Temple," and the "Shadow of Death" (1873). The last four are perhaps Hunt's greatest; and multitudes who do not care to understand the *vexata quæstio* of Pre-Raphaelitism, have been moved by their tenderness and religious truth.

HUNT, WILLIAM MORRIS, 1824–79, b. Vt.; an artist, and one of the first to introduce the characteristics of the French school into the United States. He was a pupil of Couture in Paris in 1848. Among his productions are "The Lost Kid," "The Choristers," "Girl at the Fountain," "Marguerite," "Morning Star," "Bugle Call," etc. He also painted portraits of many celebrated persons, excelling in this department of art, but gaining his high reputation through his skill and originality in genre-painting.

HUNTER, the name of a river in New South Wales, which enters the Pacific 75 m. n. of Sydney.

HUNTER, DAVID, b. D. C., 1803; graduated at West Point in 1822. In the war of the rebellion he commanded a division at Bull Run, in which conflict he was wounded, and was at once promoted to maj.gen. of volunteers. While in command of the department of the south in 1862 he declared slavery abolished, but was overruled by president Lincoln. He was on the commission that tried the murderers of Lincoln, and in 1866 was placed on the retired list.

HUNTER, JOHN, the greatest name in the combined character of physiologist and surgeon that the whole annals of medicine can furnish; was b. at Long Calderwood, in Lanarkshire, in 1728, and was the youngest of 10 children. One of his brothers, William, claims a separate notice. One of his sisters, Dorothea, was married to Dr. James Baillie, professor of divinity in the university of Glasgow, and was the mother of Matthew Baillie (q.v.), and Joanna Baillie (q.v.). The fact that his father died when Hunter was only 10 years of age, and the probability that he was over-indulged by his mother, explain how, at the age of 20, he could simply read and write, and was ignorant of every language except his own. The fame of his brother William's success as an anatomical lecturer, made Hunter desirous of entering into the same profession, and he

accordingly applied for and obtained the situation of assistant in the dissecting-room. His progress in anatomy and surgery was so rapid that in the second session he was able to undertake the directing of the pupils in their dissections. He studied surgery under Cheselden (the celebrated lithotomist), at Chelsea hospital, during the summer months of 1749 and 1750; and subsequently under Pott.

In 1753 Hunter entered as a gentleman commoner at St. Mary's hall, Oxford; but finally deciding on confining himself to the practice of surgery, he entered St. George's hospital as surgeon's-pupil in 1754, and two years afterwards served the office of house-surgeon. In the course of this year (1754), Hunter became a partner with his brother in the anatomical school. After 10 years' hard work in the dissecting-room his health began to give way, and in 1759 he was strongly advised to seek a more southerly climate. With this view he applied for an appointment in the army, was immediately made staff-surgeon, and sent out to Belleisle, and afterwards to the Peninsula; but in 1763, peace having been proclaimed, he returned home, permanently settled in London, and with nothing but his half-pay and his own talents to support him started as a pure surgeon. For a while he had not a great practice, and consequently devoted much time and money to comparative anatomy. He was in the habit of purchasing the bodies of animals that died in the tower, and in traveling menageries; and in order conveniently to carry on his anatomical and physiological inquiries, he purchased a piece of ground at Earl's Court, Brompton, where he built a small house, in which he made most of his researches. In 1767 he was elected a fellow of the royal society, and in the following year was appointed surgeon to St. George's hospital. This appointment led to an increase of his practice, and enabled him to take pupils, each of whom paid him 500 guineas. Jenner (q.v.) was one of the earliest of these, and always spoke of his old master in terms of regard and affection. In 1771 he married Miss Home, sister of Mr. (afterwards sir Everard) Home.* His practice at this time was increasing rapidly, but his income never reached £1000 a year until 1774. In 1773 he had the first attack of a disease (*angina pectoris*) which ultimately proved fatal. In 1776 he was appointed surgeon-extraordinary to the king.

In 1783 he determined to build a museum. The building, which was completed in 1785, consisted of an upper room for the reception of his collection, 52 ft. long by 28 wide, under which were a lecture-room, and another room which became the place of meeting of the lyceum medicum, a society established by Hunter and Fordyce. It was in Dec. of that year that he planned and carried into execution his famous operation for the cure of aneurism—that of simply tying the artery at a distance from the tumor, and between it and the heart, thus introducing into surgery an improvement which has been more fruitful in important results than any since Ambrose Paré's application of ligatures to divided arteries. In 1786 Hunter was appointed deputy-surgeon-general to the army; in 1787 he received the Copley medal from the royal society. He was now universally acknowledged, by all the younger surgeons, as the head of his profession; but most of his contemporaries looked upon him as little better than an innovator and an enthusiast. He died Oct. 16, 1793, and was buried in the church of St. Martin's-in-the-Fields, from whence his remains were removed, in 1860, to Westminster Abbey, where a suitable tablet to his memory has been erected by the council of the royal college of surgeons.

Some idea may be formed of Hunter's extreme diligence, by the fact that his museum contained at the time of his death 10,563 specimens and preparations illustrative of human and comparative anatomy, physiology, pathology, and natural history. He died in comparative poverty, and his collection was purchased, two years after his death, by government for £15,000, and was presented to the royal college of surgeons, by whom it has been much enlarged.

In addition to numerous papers contributed to the *Transactions* of the royal and other learned societies, he published the following independent works: *A Treatise on the Natural History of the Human Teeth* (part i. 1771; part ii. 1778); *A Treatise on the Venereal Disease* (1786); *Observations on Certain Parts of the Animal Economy* (1786); and *A Treatise on the Blood, Inflammation, and Gunshot Wounds* (published in 1794). Mr. Palmer, with the literary assistance of several eminent surgical friends, published an excellent edition of *The Works of John Hunter, F.R.S., with Notes*, in 4 volumes, in 1835. To this is prefixed *The Life of John Hunter, F.R.S.*, by Drewry Otley, from which most of the materials of this sketch have been taken.

HUNTER, Robert Mercer Taliaferro, b. Va., 1809; educated at the state university, and began the practice of law. In 1837 he was a member of congress, and two years afterwards was chosen speaker of the house of representatives. In 1846 he was elected to the senate. When the rebellion began he went with the confederates and was for a brief time the secretary of state of the temporary confederate government. In 1865 he was one of the peace commissioners sent to confer with president Lincoln, but the conference amounted to nothing. His acts of treason were pardoned by Andrew Johnson in 1867.

*Mrs. Hunter had a taste for music, and was the auther of several popular songs. *My Mother bids me bind my Hair* is one of hers, and was written to an air of Pleydell's.

HUNTER, WILLIAM, M.D., the elder brother of John Hunter, was b. at Long Calderwood, in the parish of Kilbride, Lanarkshire, in 1718, and died in London in 1783. After studying for five sessions in the university of Glasgow, with a view to entering the church, he determined to devote himself to the profession of physic. He passed the winter session 1740–41 in Edinburgh, and in the summer 1741 arrived in London, where he resided with Dr. James Douglas, the well-known anatomist and obstetric physician, for the double purpose of assisting in dissections, and superintending the education of his son. Hunter was then entered as a surgeon's pupil of St. George's hospital, and as a dissecting pupil of Dr. Frank Nicholls, who was then teaching anatomy with great success. To teach anatomy was now the object of his ambition, and in 1746 an opportunity of doing so occurred. A society of naval surgeons had for several years engaged Mr. Sharpe to deliver a course of lectures on the operations of surgery, and on his resignation, Hunter received the appointment. He gave so much satisfaction, that the society requested him to extend his plan to anatomy. In 1747 Hunter was admitted a member of the corporation of surgeons. In the early part of his career, he practised both surgery and midwifery, but he gradually confined himself to the latter line of practice. He was appointed one of the surgeons-accoucheur to the Middlesex hospital in 1748, and to the British lying-in hospital in 1749.

In 1762 Hunter was consulted by queen Charlotte, and two years afterwards was appointed physician-extraordinary to her majesty. In 1767 Hunter was elected a fellow of the royal society, and in the following year was appointed professor of anatomy to the royal academy. In 1770 he removed to Great Windmill street, where he had built a house, in connection with which were a roomy amphitheater for lectures, a dissecting-room, and a magnificent room which was to form his museum, which consisted of anatomical preparations executed by himself and his pupils, purchases from other museums, also minerals, shells, and other objects of natural history, together with a very rare cabinet of ancient medals and coins.

An estrangement which took place between Hunter and his brother continued till the former was on his death-bed, when his brother requested that he might be admitted to see him. This was acceded to, and he continued to visit him daily, and to afford him professional assistance, until his death. Together with the bulk of his fortune, Hunter left his museum to Dr. Baillie for a period of 30 years, after which it was to be handed over to the university of Glasgow, to which institution he bequeathed £8,000 for its maintenance and increase.

Hunter excelled as a lecturer in clearness of arrangement, aptness of illustration, and elegance of diction. "He was, perhaps, the best teacher of anatomy that ever lived." He published several important contributions to medicine, of which the most important is his *Anatomical Description of the Human Gravid Uterus and its Contents,* which did not appear in its perfect form till after his death.

HUNTERDON, a co. in w. New Jersey, on the Pennsylvania border, traversed by three railroads and bounded on the s.w. by the Delaware river; 500 sq.m.; pop. '70, 36,963. It has a hilly and in some parts a mountainous surface, and the soil is generally fertile. The chief products are corn, wheat, oats, hay, butter, and flax. Co. seat, Flemington.

HUNTER'S POINT. See LONG ISLAND CITY.

HUNTING. The manner of conducting field sports has varied considerably at different periods. Formerly the term hunting signified the pursuit and destruction of wild animals whose presence was dangerous, or whose flesh was calculated for food. Now the word is often applied to chasing animals with hounds for sport or exercise. Xenophon tells us in a treatise on dogs and hunting that the art originated with Apollo and Diana, and asserts that the chase forms the best soldiers in the world; that it habituates men to cold, heat, and fatigue; that it kindles courage, elevates the soul, and invigorates the body; that it retards the effects of age, and renders the senses more acute; and finally that the pleasure which it affords is a sovereign remedy against all mental uneasiness. Aristotle wrote a treatise on field sports by order of Alexander the great, and Polybius relates that Maximus restored discipline in the Roman legions by often exercising them in hunting. Oppian distinguished himself by his poems on hunting, and several of the finest similes of Homer are taken from hounds in chase. The Romans at one time discouraged hunting among the upper orders of society, fearing it might become a passion which would divert them from their essential duties. But, aware of its beneficial effects in forming the people for war, they substituted the cruel and degrading exhibitions of animals destroying each other in an amphitheater. Yet we find many of their emperors encouraging hunting, and some of their best writers, such as Virgil and Horace, extolling it. The ancient Germans and Gauls were excellent hunters, and the ancient Britons had that ardent passion for the chase which has always been characteristic of England. The Anglo-Norman and early English monarchs were devoted to the art, and a code of laws relating to it was formed by one of the Welsh princes in the 12th century. We hear of fox-hounds first in the time of Edward I., and during the reign of his successor hunting in England may be said to have been reduced to something like a science. Edward III. was a great stag-hunter, and even while he was engaged in war with France, there were attached to his army

60 couples of stag-hounds and an equal number of hare-hounds. It does not appear that the fox was much in esteem for the chase by any of the Anglo-Norman sportsmen, and Somerville, in his famous poem, *The Chase*, does not treat him with the respect which he pays to the stag or the hare. Hunting, however, advanced steadily in all its branches, and flourished greatly during the last century owing to the encouragement given it by George III.

The higher kinds of game animals are now so scarce in the United States east of the Missouri river, that sportsmen can have little real hunting until they cross the Rocky mountains. In the vast area lying between that chain and the Pacific ocean may be found nearly every species of game indigenous to the North American continent. Among the latter may be mentioned the grizzly and black bears, the mountain sheep and goat, several species of deer, the moose, cougars, wolves, foxes, and many smaller quadrupeds. Of the entire area Montana, Wyoming, Idaho, Oregon, and Washington Territory are by far the best hunting grounds, as they possess all the necessary elements of soil and climate, and their population is yet small. Sporting dogs of all kinds can be utilized in every quarter of the country, but the most valuable are pointers, setters, and hounds. The greyhound can be employed in coursing hares and antelopes; the deerhound for following on open ground the elk, the moose, and the white-tailed deer; the terrier for routing foxes and badgers from their burrows; the beagle, harrier, foxhound, and other hounds are useful in certain kinds of hunting. The weapons required for the chase, in the west, are a rifle, a breech-loading shotgun, a heavy revolver, and a good hunting knife.

The hunter can estimate the size of the animals which he is trailing, by the spread of the feet on the ground; their weight, by the depth of the impression made; the speed at which they move, by the intervals between the paces, and the length of time since they passed over a spot by the freshness of the tracks. If an animal be seriously wounded, it may be detected by drops of blood, or by the irregular and straddling gait. All game quadrupeds should be hunted up wind, seldom across it, and never down it, as scent is to them what sight is to birds and feeling to human beings.

Wolves are unusually numerous throughout the whole of n.w. America, and they are equally at home on the prairie or in the forests, on the mountains or on the treeless plateaus. The bison or American buffalo is now confined to a few regions extending from British America to New Mexico, but it is nowhere as abundant as formerly. The buffalo is hunted by two methods—stalking it, and running it down on horseback; and it is estimated that a quarter of a million bison are destroyed annually. Foxes are very numerous throughout the west, and fox-hunting as carried on in Europe was a favorite amusement with the southern planters before the rebellion. Fox-hunting clubs and packs of hounds have been lately established in New York and a few other places. The American antelope is found all over the open plains of the west. If the pleasures of antelope hunting were more generally known, it would become what hare-coursing is in the British kingdom, and with this greater advantage that it affords much keener amusement, and gives hounds, horses, and hunters a better opportunity of testing their speed, power, mettle, and endurance. Hares are so abundant that they are considered nuisances in many sections of the country, and a good marksman can kill from twenty to fifty a day. In California the hare is hunted regularly with greyhounds. It is the only part of the United States where a coursing club exists. This club is governed by the same rules as those of Great Britain, and its meets are accurately reported. The progeny of the victorious dogs command a high price. The hares are hunted in various ways. One method is to run them down out of cover with slow-hounds, and shoot them as they flee past a stand; another is to course them with greyhounds; and a third way is to trap or snare them. Among the smaller game which often afford pleasant sport are the raccoon, opossum, and squirrel families. The first two are hunted principally at night as they are nocturnal in habits, and are generally killed in the leafy retreats of trees and shrubbery where they take refuge. To hunt wood-squirrels successfully small curs or terriers should be used. See FOX-HUNTING, *ante*.

HUNTINGDON, a co. in s. central Pennsylvania, on the Juniata river, intersected by the Pennsylvania railroad; 800 sq.m.; pop. '70, 31,251. The surface is mountainous and to a large extent covered with forest. The valleys are fertile, producing wheat, corn, etc. Co. seat, Huntingdon.

HUNTINGDON, the extreme s.w. co. of Quebec, Canada, on the Chateauguay river, the New York border, and the St. Lawrence, traversed by a branch of the Grand Trunk railroad; 400 sq.m.; pop. '71, 16,304. It has an undulating surface, and the soil is fertile. Chief town, Huntingdon.

HUNTINGDON, a market t. and parliamentary and municipal borough of England, capital of the co. of the same name, on the left bank of the Ouse. Huntingdon is united with its suburb Godmanchester by a bridge over the Ouse. The Great Eastern railway and the Great Northern have each a station here. There are 3 established churches, 4 dissenting chapels, and numerous schools, one of which is the grammar-school, with an endowment of £100 a year, and two exhibitions for Cambridge university. Large brick-works, two breweries, and an iron-foundry, are sources of employ-

ment. The house of Oliver Cromwell is of historical interest. Pop. of parliamentary borough ('71), 6,606; of municipal borough, 4,243.

HUNTINGDON, SELINA, Countess of, was the second of three daughters and co-heiresses of Washington Shirley, second earl Ferrars, and was b. Aug. 24, 1707. She married, in 1728, Theophilus, 9th earl of Huntingdon, and became a widow in Oct., 1746. Adopting the principles of the Calvinistic Methodists, the founder of which sect was the famous George Whitefield, she made that eminent preacher one of her chaplains, and assumed a leadership among his followers, who came to be known as "The countess of Huntingdon's connection." On Whitefield's death in 1770 she was appointed by his will sole proprietrix of all his possessions in the province of Georgia, on which she immediately set about organizing a mission to North America. Her labors at home increased with her years. For the education of ministers she established and maintained a college at Trevecca, in Wales; removed, in 1792, to Cheshunt, Herts; and built, or became possessed of, numerous chapels in different parts of the country, the principal one being at Bath. She likewise expended large sums in the support of young men trained to itinerant preaching, as well as in private charity. But with all her excellences, she was not indisposed to play the part of a female pope, and had quite a passion for carrying her point. She died June 17, 1791. By her will, dated Jan. 11, 1790, she created a trust, bequeathing her chapels to four persons, of whom lady Anne Erskine, a daughter of the earl of Buchan, was one, for their care and management after her death, when the number amounted to 64. Most of them have become, in doctrine and practice, almost identical with the Congregational or Independent body. There are now about 40 chapels belonging to this connection in England and Wales.

HUNTINGDONSHIRE, a small inland co. of England, is bounded on the e. by Cambridgeshire, on the s. by Bedfordshire, and on the w. and n. by the co. of Northampton. Area, 229,515 acres, almost the whole of which is in arable or pasture lands. Pop. '71, 63,708. It is watered chiefly by the Ouse, which flows n.e. through the s. part of the co.; and by the Nene, which skirts its northern boundary. In the southern districts the surface is diversified by low hills; the northern portion of Huntingdonshire, however, is included in the great fen-country. The soil is various; clay, however, predominates generally. Grain, with beans, rape, and clover, are the chief crops. The county returns two members to the imperial parliament.

The county of Huntingdonshire was traversed by two Roman roads, and Roman remains, as coins, pottery, etc., have been found.

HUNTING HORN, or BUGLE HORN, is a frequent bearing in heraldry. When adorned with rings, it is said to be *garnished*. If the mouth and strings of the instrument are of a different tincture from the horn, this must be named in blazon.

HUNTINGTON, a co. in n.e. Indiana, crossed by the Toledo, Wabash, and Western railroad; 400 sq.m.; pop. '70, 19,036. Surface level and soil fertile. Productions: grain, wool, cattle, and lumber. Co. seat, Huntington.

HUNTINGTON, a city in Huntington co., Ind., on the Wabash and Erie canal and the Toledo, Wabash and Western railroad; 24 m. s.w. of Fort Wayne; pop. 2,925. The city has a dozen manufactories of wooden ware, two iron foundries, two newspapers, library, reading room, museum, etc. Lime-burning is a leading occupation.

HUNTINGTON, a village in Suffolk co., N. Y., reached by the Long Island railroad; pop. '80 (of township), 8,098. The manufacture of bricks is an important industry. The region is to a considerable extent peopled with wealthy residents of New York city.

HUNTINGTON, a t. of Cabell co., W. Va., on the Ohio river, 160 m. above Cincinnati, and 52 m. w. of Charleston; pop. '70, 2,650. It is just below the mouth of the Guyandotte river, and is the western terminus of the Chesapeake and Ohio railroad, and the eastern terminus of a line of steamers run in connection with the trains. It was organized as a city in 1871, and is a place of important manufactures. It is the seat of Marshall college, a state normal school, a bank, 2 newspaper offices, 9 churches, 3 hotels, a foundry, a planing mill, and the machine shops of the railroad.

HUNTINGTON, DANIEL, b. N. Y., 1816; educated at Hamilton college. Through an acquaintance with Elliot, the portrait painter, he was led towards art, and in 1835 began to study under professor Morse, and still later with Inman. In 1839 he visited Italy; returned the next year and began work, but was compelled to desist in consequence of failing eyesight. He was again in Europe in 1854, where he painted some noteworthy pictures. After his return he was engaged chiefly on portraits, but painted also a few historical pictures, among which are: "Henry VIII. and Catherine Parr," and "Mary Signing the Death Warrant of Lady Jane Grey." Thereafter he became a permanent resident of New York, and in the course of a few years painted the portraits of many notable people of the city and country. To the people at large he is best known by the engraving of his picture of "The Republican Court in the Time of Washington," in which there are more than 60 figures, of which nearly all are accurate portraits taken from original paintings. He was for many years president of the national Academy of Design.

HUNTINGTON, FREDERICK DAN, D.D., b. Mass., 1819; graduated at Amherst, and studied theology in Cambridge divinity school. In 1842 he was a Unitarian pastor in Boston, and in 1855 preacher to Harvard university. In 1860 he became an Episcopal minister, and in 1869 was chosen bishop of central New York. Some of his publications are *Human Society as Illustrating the Power, Wisdom, and Goodness of God; Lessons on the Parables of Our Savior, and Steps to a Living Faith.*

HUNTINGTON, JEDEDIAH VINCENT, 1815–62; b. New York, a brother of Daniel. After practicing medicine for several years he became a minister of the Protestant Episcopal church. In 1849 he went to Europe and then joined the Roman Catholic communion. In Baltimore he edited the *Metropolitan Magazine*, and in St. Louis, *The Leader*. He published some novels illustrating conversion to the Roman Catholic faith, among which are *Lady Alice, or the New Una; Alban; The Forest; Blonde and Brunette; and Rosemary.*

HUNTINGTON, SAMUEL, 1732–96; b. Conn.; a signer of the declaration of independence; educated to the law, and was associate justice of the superior court of Connecticut. He succeeded John Jay as president of congress, and in 1781 resumed his judicial position. In 1786 he was governor of Connecticut and was re-elected every year as long as he lived

HUNTLY, a small burgh of barony and market t. of Scotland, in the n.w. of Aberdeenshire, situated at the junction of the Bogie and the Deveron, 20 m. s.s.w. of Banff. In the vicinity is the ruin of Huntly castle. Pop. '71, 3,570.

HUNTSVILLE, a city in northern Alabama, United States, on the Memphis and Charleston railway, 10 m. n. of the Tennessee river. It has the usual county buildings, and a large trade in cotton and imported goods with the surrounding country. Pop. '70, 4,907.

HUNTSVILLE (*ante*), sometimes called "the queen city of the mountains," one of the most important and prosperous of the towns of Alabama. It is high up on a spur of the Cumberland mountains, and is reached by a branch of the Memphis and Charleston railroad. There are a large number of manufactories in the place, a seminary, ten churches, and two newspapers.

HUNTSVILLE, the seat of justice of Walker co., Tex., on the Houston and Great Northern railroad, 200 m. s.e. of Austin; pop. '70, 1599. There are in the place a number of important manufactories. It is also the seat of the state prison, and the burial place of gen. Sam Houston.

HUNYADY, JÁNOS (Eng. John), governor of Hungary, one of the greatest captains of his age, was born towards the close of the 14th century. Hunyady's origin is wrapped in mystery, the most accredited legend being that he was a son of the emperor Sigismund by a Wallachian lady. Hunyady and his descendants had in their escutcheon a raven—*corvus*—hence the designation of Corvinus. We find Hunyady as ban of a province s. of the Danube, distinguishing himself against the Turks, who at that time were the terror of the whole of Christendom. During the period 1437–56 Hunyady was the shield of Hungary, not only against external foes, but also against the lawless attempts of the nobles. Such was the renown of Hunyady's arms, that, after the campaign of 1444, the Turks were glad to obtain an armistice of ten years. The vacillating Vladislas I. allowed himself to be induced by the papal legate, Julian Cæsarini, to break the peace he had sworn to keep. Hunyady was defeated in the bloody battle of Várna, 1444; the king perished in the fight, as also the cardinal-legate; Hunyady was captured during his flight by the voivod of Wallachia; but upon a declaration that the whole of Hungary would rise to deliver the noble prisoner, was safely escorted to the frontier, and there set free. During the minority of Ladislaus V. (son of Vladislas I.), Hunyady was elected by the nation to be governor of Hungary. The battle of Rigómagö (1447), one of the bloodiest ever fought, was lost through the treason of the voivod of Wallachia; Hunyady had once more to go through a short captivity. But the most splendid of his deeds was the storming of Belgrade, where the monk, John Capistran, carrying the holy cross, raised the enthusiasm of the Christian warriors to such a height, that a most complete victory brought that fortress again into the possession of the Hungarians. Shortly afterwards dysentery broke out in the camp, and Hunyady, the great Christian hero, after a short illness fell a victim to the disease. Capistran, 70 years old, followed his friend into the grave two months later. Hunyady left two sons, Ladislaus and Mathias (q.v.)—the former of whom was treacherously imprisoned, and beheaded at Buda, by the very prince whom his father had so faithfully served, Ladislaus V.; the latter was given in charge to George Podiebrad (q.v.) of Bohemia.

HUPEH', one of the central provinces of China, reputed the most fertile. The great river Yangtse, recently opened to foreign commerce, flows through the s. of the province, where it receives tributaries from various lakes on either side, nearly doubling its volume of water. Area, 70,450 m.; pop. 37,370,098. Wuchang is its capital.

HUPFELD, HERMANN, D.D., 1796–1866; b. Germany, and noted as a Hebrew scholar. He was professor at Marburg and Halle, and in 1843, on the death of Gesenius, took the professorship of oriental languages. His most important work is a commentary

on the Psalms, which is considered the most thorough and masterly work of its class, and has been translated into English.

HU'RA, a genus of plants of the natural order, *euphorbiaceæ*. *H. crepitans*, a native of the West Indies and tropical America, is a tree abounding in a very acrid milky juice; with stalked, heart-shaped, acuminate, leathery leaves. The fruit is a woody capsule, of the size of a pretty large apple, very much flattened, formed of 12 to 15 *cocci*, each containing a large seed, surrounding a common axis, which separate with great elastic force. Before the use of blotting-paper became general, the capsule was generally used in the West Indies as a sand-box—whence the tree is called SAND-BOX TREE—for powdering letters with fine sand; but it was found necessary to bind it with a hoop of iron, as even after being used for years, it would sometimes burst with a report like that of a pistol. The seeds are a violent drastic purgative.

HURD, RICHARD, D.D., an eminent English prelate, was born at Congreve, in Staffordshire, Jan. 13, 1720, and studied at Cambridge university, of which he became a fellow in 1742. In 1749 appeared his first notable production, *Commentary on Horace's Ars Poetica*. In 1750, on Warburton's recommendation, he was appointed one of the Whitehall preachers. He afterwards became bishop of Lichfield and Coventry, and in 1783 declined the archbishopric of Canterbury. He died May 28, 1808. His principal works are: *Dialogues on Sincerity, Retirement, The Golden Age of Elizabeth, and the Constitution of the English Government* (1759); *Letters on Chivalry and Romance* (1762); and *An Introduction to the Study of the Prophesies concerning the Christian Church* (1772). Hallam says of Hurd, that he "has perhaps the merit of being the first who, in this country, aimed at philosophical criticism." See Hurd's works, with life, 8 vols. (1811).

HURDLES, in military affairs, consist of straight, flat rectangles of strong wicker-work, about 6 ft. long, and 2 ft. 9 in. high. They are useful in many ways, both in military and civil life, either as fencing, as barriers, or in fortification, in the construction of *hurdle-batteries*. These last were the invention of sir William Congreve, who devised them as the speediest means of throwing up earthworks; three hurdles are fastened at their ends in the form of a triangle, and the central space is filled in a short time with earth. These triangles can be constructed to any ground-plan, and with their aid, a body of soldiers can intrench themselves in a few minutes. The hurdle is composed of wattles interwoven round stakes or pickets, the latter during the manufacture being fixed upright and firmly in the ground.

HURDWAR', perhaps the most famous spot on the Ganges, stands on the right or w. bank of the river at the point where it emerges from the sub-Himalayas into the plains of Hindustan. From its position on the sacred stream, it attracts immense numbers of pilgrims for the purposes of ablution. The orthodox season comprises the end of March and the beginning of April—a great fair at the same time engrafting commerce on religion. In ordinary years, the attendance amounts to 200,000 or 300,000; but on the occasion of every 12th year, the latest having occurred in 1867, the visitors, from the commencement to the close of the festival, are stated to average about 2,000,000. The place is 1024 ft. above the sea, in lat. 29° 57′ n., and long. 78° 14′ east.

HURDY-GURDY, a very old musical instrument of the stringed kind, which, under the name of leyer, or baurenleyer, spread from its native country, Germany, over a great part of Europe. The hurdy-gurdy consists of a flat, oval-shaped sounding-board, over which the strings are stretched, with a back or bottom of the same size and shape. These are bound together by tolerably deep sides, or ribs. On one side are from ten to twelve finger-keys, for shortening the sounding lengths of the strings when required. There are four strings of gut which are put into a state of vibration by being rubbed by the edge of a small wooden wheel charged with rosin, and turned by a handle. Two of the strings are tuned in unison as a key-note, or one of them a fifth above; they are placed out of reach of the keys, and form a sort of drone-bass. The other two strings are acted on by the keys, and produce a diatonic scale of from ten to twelve notes. The hurdy-gurdy is only suited to simple music, and was used for such as had many repetitions. Its simplicity and cheapness rendered it, at one time, a favorite instrument among the peasantry of Europe. The instrument is now mostly to be seen in the hands of Savoyard boys, who play it on the streets.

HURLBERT, STEPHEN AUGUSTUS, b. S. C., 1815; practiced law in Charleston and in Illinois. In the war of the rebellion he was a brig.gen. of volunteers, and was in the action at fort Donelson. He was afterwards in service at Shiloh, Corinth, Memphis, and Meridian. In 1869 he was minister of the United States to Colombia, and in 1873 he was elected a member of Congress.

HURLBERT, WILLIAM HENRY, b. S. C., 1827; graduated at Harvard 1847, and in divinity at Cambridge. After a visit to Europe he appeared in New York in literature as a writer for *Putnam's Monthly*. After some service on the editorial staff of the *New York Times* he became one of the editors of *The World*, and with some interruptions has remained connected with that newspaper for most of the time as the principal editor. As an author, outside of his journalistic career, he has given to the world *Gan-Eden, or Pictures of Cuba*, and *General McClellan and the Conduct of the War*. Mr. Hurlbert has traveled extensively in Europe, in Mexico, and in South America.

HU'RON, one of the five great lakes of the St. Lawrence, has Superior and Michigan above and Erie and Ontario below it. It separates upper Canada from the state of Michigan, and extends in n. lat. from 43° to 46° 20′, and in w. long. from 79° to 85°, and has been estimated to contain about 20,000 sq. miles. Its surface is 584 ft. above the level of the sea; its depth about 1000 feet. Its waters are remarkable for their clearness and purity, whence the lake received from the French traders the name of MER DOUCE, or fresh sea. This vast body of water is said to contain 3,000 islands, one of them, the Great Manitoulin, or Sacred island, running parallel to almost the whole of the northern coast, which is one continuous mass of comparatively barren rocks.

HURON, a co. in e. Michigan, lying between Saginaw bay on the n.w. and lake Huron on the n.e.; area 800 sq.m.; pop. '74, 11,964. Several streams flow through it; among them Pigeon river. The surface is generally level, and the soil good, being largely covered with forests. The chief productions are wheat, oats, hay, and potatoes. Co. seat, Bad Axe.

HURON, a co. in n. Ohio, on the Vermillion and Huron rivers, intersected by three railroads. 475 sq.m.; pop. '80, 31,609. The surface is mostly level, and much of it is covered with forests. Wheat, corn, oats, wool, and butter are the main products. Co. seat, Norwalk.

HURON, a co. in w. Ontario, Canada, on lake Huron, watered by Maitland river, and traversed by the Great Western railroad; 1288 sq.m.; pop. '70, 66,165. It is a lumbering and farming region, and in some places there are valuable salt springs. Chief town, Goderich.

HURON, LAKE (*ante*), one of the five great lakes on the n. frontier of the United States, lying between lake Superior on the n.w., lake Michigan on the w., and lake Erie on the s.e. It is the third in size of the great lakes, having an area of about 21,000 sq.m., and being about 250 m. long, and 190 m. wide. It receives the waters of lake Superior through the St. Mary's river, and those of lake Michigan through the straits of Mackinaw, and empties through the St. Clair river into lake Erie. It is bounded w. and s.w. by the southern peninsula of Michigan, and n. and e. by the province of Ontario, Canada. The general direction of the lake lengthwise is from n.n.w. to s.s.e., and it is divided into two parts by the Huron peninsula and a chain of islands, of which the Great Manitoulin is the largest, which inclose altogether within Canadian territory the vast Georgian bay, and Manitoulin bay. The larger portion of the lake is in the form of a crescent, with its hollow side towards Michigan, the Michigan shore being deeply indented by Saginaw and Thunder bays. The surface is 19 ft. above the level of lake Erie, 352 ft. above lake Ontario, and 578 ft. above the sea, with occasional fluctuations as in the other lakes. Its depth is very great, averaging from 800 ft. to 1000 ft., while off Saginaw bay it is said that soundings of 1800 ft., or 1200 ft. below the level of the Atlantic, have been made without finding bottom. The waters are very clear, pure, cold, and sweet, especially in the northern part, and abound in fish, of which the whitefish is the most important. There are few harbors on the w. side, but vessels find shelter in Saginaw bay, about 70 m. n. of the outlet, and also in Thunder bay, as much further north. Presque isle is also a fair harbor, and there is good shelter under the s. side of the island of Mackinaw. A number of streams of no great importance empty into the lake. The lake is subject to violent storms, but navigation is safe from May 1 to Dec. 1. Mackinaw has long been an important post for fur trade with the Indians. Bay city, at the head of Saginaw bay, is an important lumber depot, and copper mines have been opened in the upper portions of Manitoulin bay. Excellent grindstones are cut from the sandstone near Thunder bay. It is said that not less than 3,000 islands break the surface of the lake.

HURON INDIANS. See WYANDOTS, *ante*.

HURRAH', a shout of encouragement and applause, characteristically English. It serves also as a war-cry. As an engagement at sea commences, the crews of the English vessels send up deafening hurrahs; in a charge on shore, English soldiers hurrah as they rush upon the enemy. There is something strangely exciting in this simple sound, and the combatants work themselves, as they shout, into a frenzied forgetfulness of danger.

HURREEANAH, a British district in Hindustan, in the division of Hissar, under the jurisdiction of the lieutenant-governor of the n.w. provinces; area, 3,300 sq.m.; with a comparatively scanty amount of population, consisting of Hindus and Mohammedans. The district is intersected by the canal originally constructed by Feroz Toghluk, the renowned king of Delhi. This watercourse having become nearly obliterated, was cleared out by order of the British government, and made available for the purpose of irrigation. Towards the close of the last century, George Thomas, an Irish adventurer, made a bold attempt to establish an independent principality in Hurreeanah under his own rule. He fortified the principal town, collected troops, cast cannon, and coined money bearing his own name; but being attacked by a superior native force under the command of the French adventurer Perron, he was overpowered and forced to retire. The principal towns are Hissar and Hansee.

HURRICANE. See STORMS and WIND.

HURST, a charge in heraldry representing a small group of trees, generally borne upon a mount in base.

HURST, JOHN FLETCHER, D.D., b. Md., 1834; graduated at Dickinson college; studied theology in Germany, and for 8 years after 1858 was a Methodist minister in New Jersey. In 1866 he returned to Germany and taught theology in the Martin mission institute in Bremen, and afterwards traveled in several European countries. In 1871 he was chosen professor of historical theology in the Drew theological seminary at Madison, N. J., and in 1873 was made president of the institution. Some of his works are *History of Rationalism; Outlines of Bible History; Life in the Fatherland; Lecture in Defense of St. John's Gospel;* and *History of the Church in the 18th and 19th Centuries.*

HUSBAND AND WIFE are the correct legal as well as popular terms to denote two persons married to each other. The modes of contracting marriage, with the accompanying ceremonies, and the impediments to marriage, will be more properly described under the head of marriage (q.v.), and the mode of dissolving the marriage has been already partly described under divorce (q.v.). The effects of marriage on the parties, and upon their property, will here be described, for which purpose the relation of husband and wife will be assumed to have been duly constituted. And as the effect is not the same in all parts of the United Kingdom, the laws of England and Ireland, which agree in this respect, will first be stated, and afterwards those of Scotland separately.

The effect of marriage in England and Ireland may be viewed under two heads—first, as regards the persons and the personal rights of the married persons; and secondly, as regards their property. 1. As to the person. So far as regards the person of the husband, he remains in precisely the same position as before marriage. He can sue and be sued, enter into contracts, and bind himself as fully after as before marriage, and he can even make a will, and bequeath all his property to strangers, regardless of the wife. As regards the person and personal rights of the wife, however, there is a material difference. Her person is said to be merged in that of her husband, and for many purposes they are treated as one person in the eye of the law. The meaning of that is, that the wife is under many disabilities. She cannot enter into contracts in her own name, and for most of the purposes of business she cannot be treated with as apart from her husband. Even the personal property she had before marriage, unless settled upon her by some settlement made before the marriage becomes her husband's absolutely, and he can squander it at will. The principal thing which the wife can do in the way of entering into contracts after marriage, is to order goods and necessaries for the use of herself and family and for household use; but this she does not in her own right, but merely as the agent of the husband, who is presumed by the law to give her an implied authority to that effect, and therefore the wife, when ordering goods, does not in any way bind herself, but merely her husband. As, however, this power is often abused by extravagant wives, the law qualifies the power in this way, that the goods and necessaries so ordered must be reasonable, and suited to the rank and position in life of the husband. If goods are therefore ordered which are extravagant, the husband can repudiate the contract, and return them, but he cannot keep the goods and refuse payment; if, for example, he has seen his wife wearing an expensive dress which he knows he did not himself order or pay for, if he do not at once repudiate the transaction, and return the goods, he will be held to have consented and approved of the purchase, and he cannot afterwards escape liability for the price. This position of husband and wife is taken advantage of in the lower walks of life by means of the tally system, which is the cause of much demoralization. The tallyman calls upon the wife in the husband's absence and offers her goods, which are generally in the end charged for at an exorbitant rate; but as he consents to take payment by installments, and as the wife is advised to pay them secretly, the result is that the husband's money is often squandered. These transactions being a fraud on the husband, can generally be checked if, at the first moment he becomes aware of them, the husband repudiates them; and a county court, or any other court, would give him every assistance in getting rid of any liability so incurred, if he should afterwards be sued; but it generally happens that the matter has advanced too far before it is discovered; or he has done something which is construed into an adoption of the contract; or, what is frequently the case, he ignorantly supposes that he has no remedy.

The husband, being entire master of his own actions, has the power to decide where to live, and the duty of the wife is to live with him in the same house. If she refuses to do so, and lives apart without just cause, he is not bound to support her even with necessaries. If, however, she separates from him for just cause, the case is otherwise. Though the husband is bound to maintain his wife, there is, curiously enough, no direct means in England of enforcing this duty. There are circuitous means only. The wife, for example, cannot sue the husband herself, but she has an implied authority to order necessaries, and the tradesman so supplying these can sue the husband for the price. Hence it is that when a tradesman supplies a wife, who is living apart, with necessaries, before he can be sure of recovering the price from the husband, he must satisfy himself that the wife has just cause for living separately. There are several just causes for her living apart. If the husband, for example, treats her with what is deemed cruelty in the eye of the law—as keeping a mistress in the house, starving and assaulting her—she

is entitled to leave him, and she can order necessaries at his expense from any tradesman willing to supply her. There are, however, many degrees of cruelty and ill-usage for which the wife has practically no remedy, and of which the law can take no cognizance; for the law cannot remedy a tithe of the ills of life. If the husband have the means, and yet refuses to support his wife, or what is the same thing, if he willfully refuses to work, being able to do so, and she becomes chargeable to the parish, the parish authorities can seize the goods of the husband, if any, and sell them for her support; or he may be imprisoned by justices of the peace, as an idle and disorderly person, for a month. But in such circumstances the husband more frequently deserts his wife. If he deserts her, and leaves her destitute, and a charge upon the parish, he may then be treated under the vagrant act as a rogue and vagabond, and imprisoned by justices of the peace in the house of correction for three months. If the desertion continue for a period however long, it is no ground in England for a divorce; but if it is coupled with adultery, and continues two years, it will be so. It sometimes happens that after a husband has deserted his wife, she maintains herself by her own exertions, and acquires property; in such a case, her earnings (unless the marriage took place after 1870) belong to him, though the wife might in all cases get a protection order from justices of the peace, which excludes him and his creditors. Stats. 20 and 21 Vict. c. 85, sec. 21; 21 and 22 Vict. c. 108, sec. 6, 7, 8; 33 and 34 Vict. c. 93, sec. 1.

As regards crimes committed by a wife, she is in general liable to be punished for these in the same way as if she were unmarried. But there is a peculiarity as regards crimes committed by the husband and wife jointly. If the crime be treason or murder, both are punished precisely as if they were unmarried. But in all the lesser crimes, the theory as well as the practice is, that if the wife was a party to the crime, and committed it in her husband's presence, she is presumed by the law to have so acted under the compulsion or coercion of her husband, and is acquitted as a matter of course. And so favorable is the law on this ground to married women who commit crimes, that, in the absence of any direct evidence one way or the other as to where the crime was committed, it will still be presumed that the wife acted under this marital coercion, and so she escapes punishment. Another curious anomaly arising from the maxim that husband and wife are one person, is, that a wife cannot be convicted of stealing her husband's goods. If she abscond with his property, however valuable, she cannot be punished. But this rule is again qualified by the circumstance, that if she commits adultery, and afterwards absconds with the adulterer, both taking away the husband's goods, the adulterer may be convicted of the larceny, though it is doubtful if she is in that case liable to any punishment. And where the third party has not in view any adultery with the wife, but joins her in taking away the husband's goods, in many cases neither he nor the wife can be punished criminally.

Husbands and wives may be witnesses for or against other parties in all civil cases, i.e., actions and suits relating to debts, contracts, and wrongs which are not crimes, and in all inquiries of a civil nature. So when the husband is himself a party in a civil action, his wife may be compelled by the opposite party to be a witness; but in all such cases neither husband nor wife can be compelled to disclose any communication made to him or her by the other spouse during the marriage. As regards all criminal proceedings instituted against either husband or wife, the other spouse is neither competent nor can be compelled to be a witness; but where the husband and wife are not the accused, but the prosecuting parties, then, inasmuch as the crown is presumed to be the prosecutor, and they are not parties, they may be both witnesses, subject to the qualification as to not being bound to disclose communications made by and to each other during marriage. There is an exception also to the rule that neither can be a witness against the other in criminal proceedings—viz., where the wife charges her husband with an assault or other crime of greater degree upon her person, she is in that case only a competent witness against him, for otherwise the crime might go unpunished. Moreover, in all proceedings instituted in consequence of adultery of the husband or wife, neither of the married parties is competent or can be compelled to be a witness.

2. As to the property of the married persons. As regards the husband, he still remains sole owner of his property, real and personal, and can do what he likes with it; and he may, as already stated, by will devise and bequeath it all to strangers, regardless of the wife. He can also sue and be sued as before, irrespective of his wife. But as regards the wife, the case is different. Owing to her incapacity to contract or even to hold personal property independently of her husband, she can neither sue nor be sued except where she has separate property settled upon her, as afterwards explained. If she had personal property before marriage, the whole, in marriages before 1870, was the sole and absolute property of the husband immediately after the marriage, if there is no marriage settlement. All debts which were due to her before marriage also become after marriage debts due to him, provided he chooses to reduce them into possession, and sue for them. As a general rule, therefore, the wife could not, unless married after 1870, earn and enjoy her earnings separately; but this, as well as legacies coming to her, are now, by the act 33 and 34 Vict. c. 93, made the rule in all cases, and he is not liable for the wife's debts contracted before marriage, but a settlement may still vary the rule. As regards persons married before 1870, the old rule remains, that she could not sue in her own right. Hence, in cases where a debt was due to her before marriage,

or the money claimed had been earned by her during marriage, both she and her husband may sue for it, or he alone must sue for it, according to circumstances. In like manner, when the wife was in debt before her marriage, the husband, who in effect married her debts also, must be sued jointly with her; and so, if she committed some wrong, as a slander or assault, the husband must be sued jointly with her; but where she merely ordered goods which were supplied to the husband, he alone is liable, and he alone can be sued. When the wife was once sued along with the husband, both of them could be imprisoned; but the wife was immediately discharged, as a matter of course, on application to a judge, provided she had no separate property of her own out of which the debt was payable. The old rule as to the wife's personal property becoming the husband's absolutely after marriage, suffered qualification when such property consisted not of money or chattels, but of what are called chattels real, such as leases and mortgages. In such a case, they become so far the property of the husband, that he can sell them during his life, but he cannot bequeath them by will; and on his death they remain hers, while on her death they become his. Again, where the wife's personal estate before marriage consisted of mere rights of action or debts due to her, they were so far his that he could at any time sue for them, and so reduce them into possession, and make them his own absolutely, but could not bequeath them by will: and if he did not sue for them in his lifetime, they survived to the wife after his death. As regards the wife's real estate—i.e., her lands and houses held in freehold—the husband does not acquire these absolutely by the marriage, but he thereby becomes entitled to a life-estate in them. He cannot sell the property, though he may sell his own life-estate in it. On the other hand, though the real estate still continues to belong to the wife, she cannot sell it, like an ordinary owner, unless she separately acknowledges the deed of sale, which is done by her going before a commissioner or a judge, who examines her in private, and explains the nature of the deed, and sees that she understands its purport, and that she acts freely, without the coercion of the husband.

On the death of one of the married parties, the property is disposed of as follows: if the husband dies, his will may, as already stated, dispose of his whole property to strangers, irrespective of the wife, and she may be left entirely destitute in consequence. But there are some things his will cannot take away from her, as, for example, her leases, separate property, etc., and her real estate. To these may be added her paraphernalia, which consists of her personal apparel and jewels; but even these will be taken by her husband's creditors, if there is a deficiency of assets. If the husband die without a will, the law is more liberal to the widow: she is entitled to one-third of the husband's personal estate absolutely, and not merely to a life-interest; she is also entitled to dower out of her husband's real estate, i.e., to a life-interest of one-third of the whole real estate which belonged to him. This right of dower, however, can in general be defeated by the husband's will. When the wife dies before the husband, he becomes entitled to nearly all her personal estate, of whatever description, even though she left children of the marriage; and it must be recollected that she can in general make no will which has any effect, if the husband chooses to repudiate it. As regards the wife's real estate, if a child has been born, who might by possibility have inherited her real estate, then the husband has, by the courtesy of England, an estate for life in the whole of such real estate; but if no child has ever been born, the real estate goes to the wife's heir-at-law, or if none, to the crown.

The common law of England has been often considered, especially of late years, as unjust towards women, in subjecting them too much to the caprice of their husbands. There are, however, several ways of avoiding this, but they are only available, as will at once be seen, to the rich. The most effectual way of preventing the husband having powers so absolute as the law gives him, is by executing a marriage settlement before marriage. By means of a settlement, not only all the property which the wife has before marriage, but also all which she expects to have during marriage, may be settled upon her to her separate use, and put entirely out of the power of the husband. This is done by the agency of trustees, who hold and manage her property as their own, keeping the husband at arms' length, and yet she has almost the same power of acting independently as if she were not married: she can draw her rents, keep her bank-account, enter into contracts, and bond her separate property, and also execute her will, as if she were a man. Sometimes the husband and wife both settle their property by the same settlement; or if the wife has no property, the husband may settle his upon her in the same way. She is in that case generally allowed a certain sum per annum as pin-money, to spend upon her personal adornment; and by means of her trustees, she can sue her husband for this sum, if not punctually paid. Sometimes, by the marriage settlement, if the husband had no money, the wife's money is settled partly upon him, so that he has a certain allowance per annum; but in the event of his becoming insolvent or bankrupt, the money is not to go to his creditors, but to remain for the wife's use. In short, there is practically no limit to the variety of mutual arrangements, by means of a marriage settlement, for providing against the possible hardships of the common law. It is on the same principle that, in some cases, the court of chancery has interfered to prevent the husband acquiring so absolute an interest in the wife's property as the common law gives him. But a great step towards emancipating married women's property from their husband's power was achieved in 1870 by the act 33 and 34 Vict. c. 93, which, as

already stated, made the wife's earnings and legacies her separate property, and enabled her to make deposits in savings banks, and in the funds, and to insure her own or her husband's life for her own exclusive benefit, and so that she can sue in her own name for her separate property. This act has some defects which the legislature must sooner or later remedy and extend, for the better protection of women, and unremitting efforts have been used for this purpose.

When a marriage is once contracted, the parties cannot of themselves, or by any arrangement they can enter into, put an end to it; nothing can do this but a divorce, or the death of one of the parties. It is a delusion not uncommon among the working-classes, that if one of the parties runs away or disappears, the marriage is at an end, and the party left behind may, at least after a time, marry again. This is, however, not the case. It is true, that if one of the parties has not heard of the other for seven years, and has reason to believe that that other is dead, the former cannot be convicted and punished for bigamy in marrying again. But this is merely an excuse for escaping the usual punishment; the second marriage only remains good if the lost party is really dead, or never turns up again. If at any time, however remote, the party supposed to be dead returns, the first marriage still remains good, and the second bigamous marriage becomes a nullity, and the children born of it, if any, are bastards, so that so long as both parties live, the only way of dissolving the marriage, so as to permit either to marry again, is a divorce, which can be obtained only on certain grave grounds. There is an intermediate state, called *judicial separation* (q.v.), which can be brought about for certain grounds less than what would warrant divorce. But though a wife judicially separated may enter into contracts, and is, as regards her dealings, much the same as an unmarried woman, she is still a wife, and cannot marry again; and if the parties are living separate by mutual agreement, they are nevertheless married, and have most, though not all, of the rights of married persons.

Scotland.—The law of husband and wife in Scotland as regards their personal rights and disabilities, and the property during the marriage, does not substantially differ from the law of England and Ireland, but the following points may be noticed. As regards their persons and personal rights and crimes, the law is the same. It is often said that in Scotland the movable property of both husband and wife become a kind of joint-stock property, called *goods in communion* (q.v.); but this phrase has no meaning except with reference to the principle of the division of the property after the death of one of the parties, and the dissolution of the marriage. The husband is, as in England, entire master, except that he cannot on death-bed bequeath more than a share of the property away from the wife. The wife's movable property becomes the husband's, and her heritable property remains subject to the husband's life-rent. When she disposes of her heritable property, she must ratify the deed by going before a magistrate, and acknowledging that she acts of her own free will. When the husband deserts her, she may, as in England, obtain a judge's order to protect her earnings and moneys; and she has a preferable right to a reasonable provision out of any property to which she may succeed. (Conjugal rights amendment acts, 1861 and 1874.) By the married women's property (Scotland) act, 1877, the produce of a wife's industry or skill is excluded from the rights of her husband, and his liability for her antenuptial debts is restricted to the amount she brought into the marriage. A wife has, in Scotland, the power to bind her husband for necessaries; but the husband can, by a process of inhibition, give notice to tradesmen not to supply her at his expense, and this notice will be binding on all the queen's subjects. No such notice in England would have so strong an effect: but even in Scotland such a notice as inhibition does not prevent the wife ordering necessaries, if not otherwise supplied. A rich wife is bound, in Scotland, as in England, to maintain her husband out of her separate estate. In Scotland, as in England, the rights of the parties may be varied by an antenuptial contract or marriage settlement; but there is less need for it, for the common law makes a provision for the wife in spite of her husband, since he cannot by will bequeath away from her more than one-third or one-half of his movable property respectively, according as there are children or no children. See GOODS IN COMMUNION, WILL. In Scotland, as in England, the married parties may also execute a post-nuptial contract, which will be binding if the husband was solvent at the time of executing the deed; but though in England it will be in that case valid both as against wife and children and creditors, yet in Scotland it will bind the wife and children only if they thereby get a better provision than they would have been entitled to independently of any deed, or at least something which they accept as equivalent. And, as a general rule, nothing can be done after marriage by the parties so as to settle the property on either party, if the effect is to defeat their then creditors. The Scotch widow's terce corresponds to the English widow's dower, and the rule as to the paraphernalia is not substantially different. The law as to the dissolution of the marriage and bigamy is the same in Scotland, though the grounds of divorce are more liberal in Scotland. See DIVORCE. Paterson's *Compendium of English and Scotch Law.*

HUSBAND AND WIFE (*ante*).—A little more than thirty years ago the legal status of husband and wife in respect to each other and to society, in all or nearly all the states of the American union, was nearly the same with that in England. Under the common law, wives were often subjected to great hardship. Half a century ago the

public attention was called by a few earnest people to the essential injustice of these long-established doctrines, the key to which is found in the maxim that the legal existence of the wife is merged in that of her husband. The agitation, though discountenanced and ridiculed for a time, took fast hold upon the public conscience, and found expression in numerously signed petitions to the legislatures for a reform of the obnoxious laws. While the claim of the agitators that women should be permitted to vote and be made eligible to office was lightly regarded, conscientious legislators would not refuse to listen when wives and mothers besought them to redress odious and inhuman abuses. Women who had made a study of the subject were accorded a hearing before legislative committees. New York was the first state to respond to the demand for reform, but the example was followed by others in rapid succession, until now the common law doctrine that a wife's legal existence is merged in that of her husband is regarded with universal disfavor as a relic of barbarism. The laws of the states differ in some respects from each other, but as a general rule the real and personal property possessed by a woman at the time of her marriage, or which she may acquire thereafter, remains her own, free from any interest of the husband or any claim of his creditors. In some of the states, but not in all, she is permitted to convey her property by deed, or to bequeath or devise it by will. In New York and a few other states, she is allowed to manage her property as if single, to make contracts concerning it, to engage in any trade or business, to appropriate her own earnings, to sue and be sued, and to maintain actions in her own name for injuries done to her person, property, or character. As truly, as wittily said, that in the eye of the common law husband and wife are one, and that that one is the husband; but under the new legislation the wife has the same standing before the law as her husband. In the western and southern states the wife has a secure interest in the homestead, and cannot be dispossessed without her consent. The new legislation has not changed the common law presumption that it is the husband's duty to support his family, to furnish a home for his wife, and provide her with such means of subsistence as are suitable to his station in life. As a general rule it is still the right of the wife to procure the necessaries of life upon his credit. She may leave him, if she chooses, and there is no law to compel her to return; but in that case, her right to a support from him will cease. If she be enticed away or seduced, the husband may recover for any pecuniary damages thereby incurred. The old rule, that he is responsible for any crime committed by her in his presence and by his direction, remains in force. In many of the American states husbands and wives may be witnesses against each other, except as to facts communicated in marital confidence.

HUSBANDRY, PATRONS OF. See GRANGE, *ante*.

HUSBANDRY, SERVANT IN. Under a variety of acts, agricultural servants could be sentenced to imprisonment by a justice of the peace for breach of the contract of service. This liability was abolished in 1875, and husbandmen are now entitled to the remedies provided by the employers and workmen act of that year.

HUSBANDS, HERMAN, d. 1794; prominent in the American revolution; member of the Pennsylvania legislature, and one of the leaders of the "regulators in North Carolina." He was an associate of Albert Gallatin and other patriots, but after the peace was compromised in the whisky insurrection in Pennsylvania and imprisoned.

HUSCH, a t. of Moldavia, on a feeder of the Pruth, 40 m. s.e. from Jassy. It is the capital of a district. Here the treaty between the Russians and Turks was signed in 1711. Pop. about 12,000.

HUSKISSON, WILLIAM, an eminent English statesman, was b. at Birch Moreton, in Worcestershire, Mar. 11, 1770, and in 1783 was sent to Paris to study medicine. He took part in the storming of the Bastile, and as a member of the club of 1789, attracted attention by a number of speeches on subjects of political economy. In 1792 he returned to England, received a subordinate appointment under the tory government, and formed an intimate acquaintance with Pitt and Canning. In 1795 he was selected by Dundas, the war minister, to be first under-secretary; and sat in parliament for Morpeth. He subsequently held several offices under Pitt, with whom he retired in 1801, and on the dissolution of parliament in 1802, lost his seat in the house of commons. In 1804 he was returned for Liskeard, and was appointed secretary of the treasury in the new Pitt cabinet. On Pitt's death, however, in 1806, he lost this office, but was restored to it by Mr. Percival in 1807. He sat for Harwich, 1807–12; Chichester, 1812–23; and Liverpool, 1823–30. In 1814 he was chief commissioner of the woods and forests; in 1822, president of the board of trade; in 1827, secretary of state for the colonies; and in 1828, secretary of state for foreign affairs. But this office he resigned, and retired from the ministry the same year. Through his exertions the old restrictions on the trade of the colonies with foreign countries were removed. He also obtained the removal or reduction of many import duties, considerable relaxation of the navigation laws, and is allowed to have been the great pioneer of free trade. He received fatal injuries at the opening of the Liverpool and Manchester railway, Sept. 15, 1830, and died the same evening. A collection of his speeches was published in 1831. Both from the comprehensiveness of the views which they exhibit, and their fullness of accurate details, they are interesting to the student of political economy.

HUSS, JOHN, the Bohemian reformer, whose name is associated with that of Jerome of Prague (q.v.), both on account of the work which they wrought and the death which they suffered, was b. in 1373 at Hussinecz, near Prachaticz, in the s. of Bohemia. He studied at the university of Prague, where he soon made great progress in the branches of learning most valued in that age, took his degree of master of arts in 1396, and began to lecture publicly in 1398. In 1402 he became preacher in the Bethlehem chapel in Prague, and labored with the greatest earnestness for the instruction of the people, and in the discharge of all his clerical functions. As a preacher he was greatly esteemed both by the common people and by the students; whilst as confessor to queen Sophia he obtained access to the court. At this time he became acquainted with the writings of Wickliffe, which exercised a great influence over him. The monks and clergy were of course violent enemies to Huss, as he denounced, with continually increasing boldness, their corruptions. Archbishop Sbinko burned the writings of Wycliffe in 1410, in compliance with a brief of pope Alexander V., and complained to the pope of Huss as a Wycliffite. Hereupon he was summoned to Rome; but he did not go, and the combined influence of the people, the court, and the university, compelled the archbishop to remove a prohibition which he had issued against his preaching. But in 1412, pope John XXIII. having published a bull of indulgence in order to a crusade against Ladislaus, the excommunicated king of Naples, whose kingdom the pope claimed as a papal fief, Huss boldly raised his voice against the whole procedure as unchristian, whilst Jerome of Prague also stood forth to condemn, in the strongest manner, both the bull and the vendors of indulgences. An interdict against Huss, in 1413, was the consequence. Huss, however, appealed from the pope to a general council and to Christ, and wrote a book, *On the Church*, in which he condemned the abuses of the papacy, and denied the unconditional supremacy of the Roman pontiff. Thinking himself no longer safe in Prague, he now retired to his native place, where he preached the gospel with great power. In 1414 he went to Constance to the general council, summoned thither, indeed, on a charge of heresy, but under the protection of king Wenceslaus, and having a safe-conduct from the emperor Sigismund. Having reached Constance Nov. 3, he was, on the 28th of the same month, apprehended in spite of the remonstrances of the Bohemian and Polish nobles. His trial was conducted with little regard even to the appearance of equity. July 6, 1415, thirty-nine charges were exhibited against him, some of which he acknowledged as exhibiting his doctrine, whilst others he utterly denied. Being required to recant his alleged errors, he refused to do so until they should be proved to be errors. He and his writings were now condemned to the fire, and in spite of his safe-conduct, the sentence was carried out on the same day, and the ashes of the martyr were thrown into the Rhine. See Palacky's *Gesch. von Böhmen.*

HUSSAR', a light-cavalry trooper, dressed in a loose jacket, with other articles of attire easy in set, and a fur cap; armed usually with a saber and pistol. The idea of these troops, now in every army, came originally from Hungary. There were 13 regiments of Hussars in the British army in 1877.

HUSSITES, the followers of Huss (q.v.). Honoring him and Jerome of Prague as martyrs, they despised the decrees and anathemas of the council, and took terrible revenge on the priests and monks. The symbol of their confederacy was the cup, the use of which in the Lord's Supper they extended to the laity, as James de Misa had already done with the approbation of Huss. In 1417 king Wenceslaus was constrained to grant them the use of many churches. After his death, Aug. 13, 1419, the majority of the states refused to acknowledge his brother, the emperor Sigismund, who had broken his safe-conduct to Huss. And the papal instructions to the cardinal legate, John Dominico, requiring him to employ violent measures for the conversion of the Hussites, an insurrection ensued, and the war began which is known in history as the Hussite war. Convents and churches were reduced to ashes, and priests and monks were slain. The Hussites divided into two parties—the *Calixtines* (q.v.), and the *Taborites* (q.v.). See *Huss et la Guerre des Hussites*, by Ernest Denis (1879).

HU'STED, JAMES W., b. N. Y., 1833; graduated at Yale and was admitted to the bar in 1857. After filling a number of local offices he was chosen to the legislature, and in 1847 was speaker of the assembly.

HUSTINGS (Ang.-Sax. *husting*, a place of council), a place or platform where members of parliament are formally proposed or nominated for election.

HU'SUM, a t. of Prussia, in the province of Sleswick-Holstein, and 22 m. w. of the town of that name, is situated on the coast of the North sea, at the mouth of a small river. It was formerly strongly fortified, and possessed many ships. Pop. '75, 5,765, who manufacture leather and tobacco, and carry on distilleries and breweries, and some trade in wool and cattle.

HUT, in army affairs, is a wooden structure, more or less rough in its details, for the housing of troops. It is substituted very often for the tent, when the sojourn in a camp or cantonment is likely to be of consideration, as, for instance, through a winter—a hut, however rude, which is wind and water-tight, being as superior in comfort to a tent as the latter is to the open air. Huts may be made of almost any size, and are sometimes for one officer; at others, for as many as 100 men. The principal hut encampments at

present in the United Kingdom are at Aldershot, Shorncliffe, Colchester, and the Curragh of Kildare; in British North America, hut-camps are situated at intervals of a day's march on the route from New Brunswick to Quebec, and the troops who made that winter-march in 1861 to 1862 found their shelter truly welcome.

As the hut is as useful to the settler in a wild country as it is to a soldier, we give some of the particulars of their manufacture in different forms. Huts are of four sorts: 1. The *log* hut; 2. The *framed* hut; 3. The *pisé* hut (of tempered clay).

The *log hut* is formed of rough logs or trunks of trees, laid crosswise in tiers to the required height, the angles being formed by a notch on each side of the log, about one-third of its diameter in depth, and a few inches from the extremity. The space between the logs is then made water-tight and air-tight by a stuffing of clay, wattles, sallows, or small bundles of twigs. Within, the joints should be lined with laths, or the whole interior may be boarded with inch-planks, if such are attainable. The roof should be supported by a scantling (see ROOF), and may consist of overlapping boards, or boards laid flush and shingled, or laths and shingles, or even birch-bark alone. The door is usually ledged, and there are one or two windows, with glazed sashes and shutters. These should be made by regular carpenters, and taken to the place of building ready for use. A hut thus formed makes a snug habitation, and will last for many years; exclusive of the sashes, two men can erect, in about a week, a hut of rough logs which shall be sufficiently large for their residence—that is, with an interior area of about 15 ft. by 10 feet.

When circumstances permit the logs are occasionally squared, which enables them to be fitted more accurately to each other, and adds, of course, to the solidity and finish of the whole structure, as well as to its durability. In this case the corner logs, instead of crossing each other, are joined by a dove-tail, or by cutting the end of each to an angle of 45°.

The *framed* hut has the advantage over the log hut of allowing more exactness of finish and from its lightness and portability being easily transported to any place where logs for hut-building might not be forthcoming. It consists of a strong framework of squared wood, properly fitted together, and covered with overlapping planks or weather-boards. The pieces should be sawn to the proper size, fitted to each other, and numbered; then packed together in small compass for conveyance to the intended site, where the structure can soon be erected. No one piece need exceed 11 ft. in length, 6 in. in breadth, and 2 in. in depth. The uprights should not be more than from 15 in. to 18 in. apart, and should be firmly held by diagonal tie-rods. The first step is to carefully level the ground on which the hut is to stand, and if a dwarf-wall of stone or brick, 8 or 10 in. high, can be built round, so much the better. On this ground or wall a rectangular frame of thick wood (say 6 in. by 3) must be laid as a basis for the framework; on this latter the uprights are placed, the binding tie-rods fixed, and the cap-sill, corresponding to the frame below, placed above all, every joint being carefully mortised and tenoned. The weather-boards can now be nailed on the outside, and when the roof is put on, the hut is complete. The breadth should not, for stability, exceed 16 ft.; and when the hut is of any considerable length, cross-beams should be thrown from side to side at the top. The roof should be made of ordinary scantling, as described under ROOF. It is usually estimated that one of these huts, 30 ft. long, 16 broad, and 10 high, makes a good barrack-room for 20 soldiers. The camps at Aldershot and the Curragh are mainly formed of framed huts. Where extra warmth is desired, the spaces between the uprights are built up roughly with bricks, burned or unburned.

Pisé huts, common in the s. of France, and very useful where wood is scarce, as well as very comfortable, are walled with blocks of clayey earth, rammed with great pressure into wooden molds until they assume the forms of stones. These are laid one above each other much as stones themselves would be by a mason, and the wall so formed is both durable and sightly.

The most critical operation for the non-professional hut-builder is roofing. This is usually of thatch, shingles, paper, or felt, if lightness be an object; and of stones, bricks, or tiles, if the walls be calculated to bear their pressure.

HUTCHESON, FRANCIS, a distinguished philosopher of last century, was the son of a Presbyterian minister in the n. of Ireland, where he was born in 1694. He studied for the church at the university of Glasgow, but shortly after the completion of his theological course, he was induced to open a private academy in the city of Dublin, which proved highly successful. In 1720 he published his *Inquiry into the Original of our Ideas of Beauty and Virtue*, etc., which was the means of introducing him to the notice of many influential personages, such as lord Granville, then lord-lieutenant of Ireland, archbishop King, primate Boulter, and others. This work was followed, in 1728, by his *Essay on the Nature and Conduct of the Passions;* and in the year after, he was appointed professor of moral philosophy in the university of Glasgow. Here he died in 1747. His largest and most important work, *A System of Moral Philosophy*, was published at Glasgow in 1755 by his son, Francis Hutcheson, M.D., with a preface on the life, writings, and character of the author, by Dr. Leechman, professor of divinity in the same university. As a metaphysician, Hutcheson may be considered a pioneer of the so-called "Scotch school." From the period of his lectures, according to Dugald

Stewart, may be dated the metaphysical philosophy of Scotland, and, indeed, the literary taste in general, which marked that country during the last century, although, as Stewart acknowledges and Hamilton shows, traces of the Scotch philosophy appear in earlier writers. But it is as a moral philosopher, rather than as a metaphysician, Hutcheson shines. His system is, to a large extent, that of Shaftesbury, but it is more complete, coherent, and clearly illustrated. Hutcheson is a strong opponent of the doctrine that benevolence has a selfish origin. The faculty by which moral distinctions are recognized, Hutcheson (after Shaftesbury) terms a *moral sense*. See ETHICS.

HUTCHINS, THOMAS, 1730–89; b. N. J.; at an early age entered the British military service and was engaged in Indian wars. He was in London in 1779 and was imprisoned on suspicion of favoring American independence. Escaping by way of France, he came to Charleston and took service under gen. Green in the continental army. He was favorably known as a topographer and a maker of maps.

HUTCHINSON, a co. in s.e. Dakotah, on Dakotah river; 432 sq.m. Formed since the census of 1870. It is generally level, and there is very little timber. Co. seat, Olivet.

HUTCHINSON, ANNE, a religious enthusiast, of American celebrity, emigrated from Lincolnshire, England, to Boston, Massachusetts, in 1636. Living in a community prone to religious excitement, she claimed to be a medium of divine revelations, and held meetings for women, in which she held forth Antinomian doctrines. Great controversies arose, and a synod was called, in which her teachings were condemned, and she was banished from the colony. She and her friends now obtained from the chief of the Narragansetts liberty to reside in Rhode Island, where they set up a community on the highly commendable principle, that no one was to be "accounted a delinquent for doctrine." After the death of her husband (who shared her opinions), she removed to a Dutch settlement, in the colony of New York, where, in 1643, she and her whole family of 15 persons were taken prisoners by the Indians, and all but one daughter barbarously murdered.

HUTCHINSON, JOHN, 1616–64; b. England; represented Nottingham in parliament, and was a member of the court for the trial of Charles I., concurring in the sentence. He was arrested, and imprisoned, and died while in confinement. A memoir of his life was written by Lucy Hutchinson, his wife, and published in London in 1806.

HUTCHINSON, JOHN, an English theological writer, b. 1674 at Spennithorne, in Yorkshire. He was for some time steward of the household of the duke of Somerset, and left his service to devote himself to his religious studies, the duke procuring for him a sinecure appointment of £200 a year from government. In 1724 he published the first part of a work called *Moses's Principia*, in which he defended what he regarded as the Mosaic cosmogony, and assailed Newton's theory of gravitation. He continued to publish a succession of works till his death, which took place on Aug. 28, 1737. His religious system is best exhibited in his *Thoughts concerning Religion*. The leading principle of it is that the Holy Scriptures contain the elements not only of true religion, but of all rational philosophy, which, however, was to be derived only from the original Hebrew; and it, for that purpose, was subjected to strange critical or rather fanciful processes. His works at one time exercised a considerable influence. His followers were called HUTCHINSONIANS, and among them—strange as it may seem—were persons of considerable learning and celebrity.

HUTCHINSON JOHN, 1674–1737; b. England; remembered as an opponent of Newton's theory of gravitation. He published several works containing an interpretation of the Hebrew Scriptures.

HUTCHINSON, THOMAS, 1711–80; b. Boston, graduated at Harvard, and began the practice of law. He was several times elected to the general court, and for three years served as speaker. In 1760 he held at one time four offices: judge of probate, councilor, chief-justice, and lieutenant-governor. In the time of the stamp act he favored the British government, for which his house was sacked and many valuable manuscripts relating to the history of Massachusetts were destroyed. In 1769 Hutchinson was made governor of the colony, but he did not receive his commission until 1771. It was proved by Franklin that he had displayed duplicity in his course with regard to the relations of Great Britain and the colonies. In 1774 he returned to England, where he died, having been pensioned by the government. He published *The History of the Colony of Massachusetts Bay* (down to 1750), and *A Brief State of the Claims of the Colonies*.

HUTTEN, ULRICH VON, famous in the history of the reformation, was descended of an ancient and noble family, and was born at the family castle of Steckelberg, in the electorate of Hesse, April, 1488. When he was ten years of age, he was placed in the monastery at Fulda; but disliking this mode of life, he fled to Erfurt in 1504, where he associated with scholars and poets. He then lived at various places in northern Germany till about 1512, when he went to Pavia to study law. After passing several years in Italy, he returned to Germany and made himself conspicuous by his publications, especially those concerning the affair of Reuchlin and the Dominican Hoogstraten, in Cologne, in which he came to the support of Reuchlin, and displayed no small

learning and great power of satire. He again went to Italy in 1515, to take the degree of doctor of law, and returned to his native country in 1517. He was crowned with the poet's laurel crown at Augsburg, and the emperor Maximilian conferred on him the honor of knighthood. In the same year he edited a work of Laurentius Valla, found in a convent, *De Falsâ Creditâ et Ementitâ Donatione Constantini Magni*, and in 1518 accompanied Albert, archbishop of Mentz, to the diet of Augsburg, where Luther had his famous conference with Cajetan. Subsequently, he established a small printing-press of his own, and employed himself in writing and disseminating pamphlets fully exposing the arrogance and wickedness of the Romish clergy. The archbishop Albert denounced him to Rome, whereupon he entered into an immediate and avowed connection with Luther, whom he had hitherto despised. At this time, also, he began to write in the German language, instead of Latin. Persecuted by his enemies, he availed himself of the protection of Franz von Sickingen, but was soon forced to flee. From this time Hutten was compelled to adopt a wandering life, and died Aug. 31, 1523, in the isle of Ufenau, in the lake of Zürich. Hutten was bolder and more open in the expression of his opinions than almost any man of his age. He did much to prepare the way for the reformation, and to promote it. It may be attributed to him as a fault, that he was too reckless of consequences, and not sufficiently tender in dealing with things that had become venerable in the eyes of many; but he was a man who feared nothing, even when almost all his friends trembled. He was a master of the Latin language. He left 45 different works, of which a collective edition was published at Berlin in 1821–27, in 6 volumes. Hutten had a share in the *Epistolæ Obscurorum Virorum* (q.v.). See life of Hutten by D. F. Strauss (1858), English translation (1874).

HUTTON, CHARLES, an eminent mathematician, was the son of a superintendent of mines, and was born at Newcastle-upon-Tyne, Aug. 14, 1737, and in 1755 became teacher in a school at Jesmond, and afterwards at Newcastle, till 1773. During this period, he published his *Treatise on Arithmetic and Book-keeping* (1764); *Treatise on Mensuration* (London, 1771); and *Principles of Bridges, and Mathematical Demonstration of the Laws of Arches* (Newcastle, 1772). In 1773 he was appointed to the professorship of mathematics at the royal military academy, Woolwich, and in Nov., 1774, was elected a fellow of the royal society. Soon after this, he was selected to perform the necessary calculations for determining the density of the earth from Dr. Maskelyne's observations on Schiehallion, and his report was published in the *Philosophical Transactions* for 1778. In 1779 he received the degree of LL.D. from the university of Edinburgh. He died Jan. 27, 1823. Hutton's most important works are—*Tables of Products and Powers of Numbers* (London, 1781); *Mathematical Tables* (London, 1785); *Mathematical and Philosophical Dictionary* (London, 1795); *Course of Mathematics* (London, 1798–1801); and *Recreations in Mathematics and Natural Philosophy* (4 vols. London, 1803); the last being a most interesting and instructive work. Besides these, he regularly contributed mathematical papers to the *Ladies' Diary*, of which he was for some time editor, and also to the *Philosophical Transactions*. His biography has been written by Dr. Olinthus Gregory.

HUTTON, JAMES, a celebrated geologist, was the son of a merchant in Edinburgh, and was b. there June 3, 1726. He studied in his native city, and afterwards at Leyden, where he took the degree of M.D. He devoted himself, however, not to the medical profession, but to agricultural pursuits and to the science of chemistry, from which he was led to mineralogy and geology. He contributed much to the improvement of agriculture in Britain. He made some chemical discoveries, and is the author of a theory of the earth and of a theory of rain. His theory of rain has been since acknowledged by men of science as generally correct, although at first it met with some opposition. His theory of the earth has for its distinguishing feature the supposed agency of a central heat, by which the elevation of strata and many other phenomena are accounted for, and some parts of it may be regarded as now also substantially admitted by all geologists, although for a time it was combated by the followers of Werner, who sought to explain everything by aqueous solution and crystallization. Dr. Hutton was indeed too extreme in his theoretical views, and some of his followers were still more so. He was, however, not only a theorist, but an observer, and his discovery of granite veins is of no small importance in the history of geology. He died March 26, 1797.

HUXLEY, THOMAS HENRY, naturalist and comparative anatomist, b. at Ealing, Middlesex, in 1825, was educated at the school in that town, and afterwards studied medicine in the medical school of Charing Cross hospital. In 1846 he entered the medical service of the royal navy, and did duty at Haslar, under the late sir John Richardson, until the winter of the same year, when he was appointed assistant-surgeon on board the *Rattlesnake*. This vessel, commanded by capt. Owen Stanley, was commissioned to survey the intricate passage within the Barrier Reef skirting the eastern shores of Australia, and to explore the sea lying between the northern end of that reef and New Guinea and the Louisiade archipelago. Imbued with a passion for natural history, Mr. Huxley devoted himself with zeal and intelligence to the study of the numerous marine animals collected from time to time during the survey, and made them the subjects of scientific papers, which he sent home, diffident as to their

value. They were published, however, by the royal society and the Linnæan society, and made their author known, while yet a young man, to the naturalists of Europe. Towards the end of 1850, the *Rattlesnake* returned to England, and Mr. Huxley had the gratification to find that his paper *On the Anatomy and Affinities of the Family of the Medusæ* had been published in the *Philosophical Transactions.* Thus encouraged, he set to work to arrange his large accumulation of facts and observations, with a hope (which was disappointed) that the admiralty would contribute towards the cost of their publication. In 1851 papers on other branches of the same subject were printed in the *Philosophical Transactions;* and in the same year Mr. Huxley was elected a fellow of the royal society. In 1852 one of the two royal medals annually given by the society was awarded to him, in recognition of the scientific value of the papers above referred to. In those papers, much light was thrown on the structure of a number of animals before unknown, or but little known, to British naturalists. In 1854 Mr. Huxley was appointed professor of natural history in the royal school of mines, in place of prof. Edward Forbes, and, among his lectures in that institution, has delivered courses to working-men with beneficial results. In 1857, jointly with Dr. Tyndall, he wrote a paper, *Observations on Glaciers,* which was printed in the *Philosophical Transactions;* and in the following year he delivered the royal society's Croonian lecture, *On the Theory of the Vertebrate Skull,* in which a highly important anatomical question was discussed. In 1859 his large work on *The Oceanic Hydrozoa; a Description of the Calycophoridæ and Physophoridæ* observed during his voyage, was published by the Ray society with illustrative plates. He has since published papers on the glyptodon, and the osteology of that genus; and in papers on the mollusca, has shown that those animals have a common type or plan, similarly to the annulosa and vertebrata. Mr. Huxley contributed largely to the *English Cyclopædia;* and papers by him have appeared in the journals of the royal, the Linnæan, the geological, the zoological, and other learned societies. *Man's Place in Nature* appeared in 1863; *Lectures on Comparative Anatomy,* in 1864; *Lessons in Elementary Physiology,* in 1866; *An Introduction to the Classification of Animals,* in 1869; *Lay Sermons, Addresses, and Reviews,* in 1870; *Critiques and Addresses,* in 1873; *American Addresses* and *Physiography* in 1877; and a short work on *Hume* in 1879. Prof. Huxley was a member of the London school board till 1872. He is professor of natural history in the royal school of mines, and Hunterian professor of anatomy to the royal college of surgeons; an LL.D. of Edinburgh; and was in 1872 elected rector of Aberdeen university.

HUY, a strongly fortified t. of Belgium, in the province of Liege, is romantically situated amid lofty rocks on both banks of the Meuse, and in the immediate neighborhood of the finest scenery of that river, 17 m. s.w. of Liege. Its citadel, the works of which are partly excavated in the solid rock, commands the passage of the river. The church of Notre Dame, a graceful Gothic edifice, was begun in 1311. In the vicinity are iron-works and coal-mines, in the products of which the inhabitants carry on a lively trade by means of the Liege and Namur railway. The principal manufactures are paper, leather, zinc, beer, spirits, and an inferior kind of wine. Pop. '70, about 11,000.

Peter the hermit, on his return from the first crusade, founded here the former abbey of Neufmoustier (*Novum Monasterium*), and was himself interred within it. Huy has been frequently taken during the wars, of which this region has been the seat. It was last captured by Marlborough and Coehoorn in 1703.

HUYGENS VAN ZUYLICHEM, CHRISTIAN, one of the great philosophers of the 17th c., was b. at the Hague, April 14, 1629, and was the second son of Constantine Huygens, secretary and counselor to the princes of Orange. Huygens studied at Leyden and Breda. His first work, *Theoremata de Quadratura Hyperboles, Ellipsis, et Circuli, ex Dato Portionum Gravitatis Centro* (Leyden, 1651), is an example of that powerful geometrical talent which lay at the foundation of all his scientific achievements. Soon after this, he constructed the pendulum-clock, following out the idea first suggested by Galileo (q.v.). A complete description of Huygens's instrument is contained in his great work, *Horologium Oscillatorium, sive de Motu Pendulorum* (Hague, 1658).

This work contains expositions of many of the cases of constrained motion, especially those applicable to the construction of time-keepers. Huygens has also developed and given precision to the investigations of Galileo upon accelerated motion under the action of gravity; and there is no doubt that to the clearness of his demonstrations, his great successor, Newton, in preparing his magnificent development of the principle of accelerating force, was largely indebted. Newton was a student and admirer of his works, and assigns to him, along with sir C. Wren and Wallis, the distinguished epithet of *hujus ætatis geometrarum facile principes.*

By means of an improved telescope of his own construction, Huygens, in 1655, discovered the ring of Saturn and the fourth satellite of that planet. In 1659 he published an account of these discoveries in a work entitled *Systema Saturnium, sive de Causis Mirandorum Saturni Phenomenon, et Comite ejus Planetâ Novo.* In the end of this work is described an invention of great importance in astronomy—namely, the micrometer (q.v.), by which small angles between objects viewed by a telescope are accurately measured. In 1660 Huygens visited England, where he was admitted a member of the royal society. He discovered the laws of collision of elastic bodies

about the same time with Wallis and Wren, and also made a material improvement in the air-pump.

In 1666 Huygens received an invitation to settle in France, with the promise of a pension from Colbert, then all-powerful in that country. He repaired to Paris, where he remained till 1681, having been admitted to the membership of the royal academy of sciences; but alarmed at the danger which seemed impending over the Protestants, he returned to his own country. After his return he still continued his favorite pursuits till his death at the Hague, June 8, 1693.

The optical works of Huygens lastly claim our attention. They are chiefly remarkable for his maintaining a theory of light, which opposed as it was to the then more popular theory of Newton, is substantially the same with that which is now called the *undulatory theory*. By means of his theory, he explained the ordinary phenomena of reflection and refraction, and further succeeded in a satisfactory explanation of the phenomenon of double refraction, which Newton's theory failed to account for.

HUYGENS (VAN ZUYLICHEM), CHRISTIAN (*ante*). The discovery of the ring of Saturn was not made with the first telescope with which Huygens discovered the fourth (then the first) satellite. That instrument, although the most powerful then made, had a focal length of only 10 feet. The ring was discovered in 1659 with a telescope of 22 ft. focal length, which besides being much more powerful than the first, had a greatly improved construction of the eye glasses—essentially the same as those used at the present day, with the exception of the achromatic combination of lenses, a comparatively recent discovery. The discovery of the ring of Saturn was one of the master exploits of science. The appearance of two luminous bodies on either side of the planet at various times had been observed by Galileo, but his telescope did not enable him to make out anything more. The appearance of the two luminous points was found by Huygens to be caused by a position of the ring by which it reflected the sun's rays. From an examination of the subject he made calculations which foretold the disappearance of the ring from view in 1671. The discovery was published in 1659 in a volume which contained, among several other discoveries, an account of the bands upon the disks of Jupiter and Mars, and of the great nebula in Orion. His *Horologium Oscillatorium*, a part of which was published in 1658 at the Hague, was not completed till 1673, and published at Paris. This book contains 13 theorems on centrifugal force, which led to most important results in the science of mechanics, and in the same work he gives a method for finding the center of oscillation. Mersenne had proposed the problem of the center of oscillation in 1646, which was not solvable by any of the then known mathematical methods. It had attracted Huygens's attention at the time, but his youthful mind was unable to cope with the subject. However, when the last part of the *Horologium* appeared, in 1673, the problem was completely solved by a method which was the first solution of a dynamical problem in which connected material points are supposed to act on one another. Newton afterwards demonstrated these 13 theorems of Huygens in a manner of his own. Huygens's own demonstrations were found after his death among his papers. The first two theorems contain the assumption of the two first laws of motion, and in his treatise *De Motu Corporum ex Percussione* he assumed the third law of motion, which Newton afterwards expressed in the words "action and reaction are equal and opposite," an equivalent for saying that the impact of two bodies does not change the quantity of motion in them—one of the grand principles of the doctrine of conservation of forces. His works were edited by 'sGravesande in four volumes, entitled *Opera Varia*, 2 vols. 4to; in one volume, Leyden, 1724; and *Opera Reliqua*, 2 vols. 4to, Amsterdam, 1728.

HUYSUM, JAN VAN, a celebrated Dutch painter of flowers and fruits, was b. at Amsterdam in 1682, and acquired the rudiments of his art from his father, a landscape-painter of very considerable talent. Huysum surpassed all his predecessors in mellowness, purity, and delicacy of coloring; the exquisite disposition of his lights and shadows; and, above all, in his miraculous rendering of dew-drops and the motions of insects. He died at Amsterdam in 1749. Huysum's masterpieces are to be found in the galleries of Vienna, Munich, Dresden, and St. Petersburg.

HY'ACINTH, a name given to the brilliantly colored varieties of the gem called zircon, also to fine red cinnamon-stone (q.v.) or pyrope (q.v.); and sometimes to ferruginous quartz of a blood-red color, which, from its occurring abundantly in gypsum at Compostella, in Spain, is called *hyacinth of Compostella*.

HYACINTH, *Hyacinthus*, a genus of plants of the natural order *liliaceæ;* bulbous-rooted plants with corolla-like, bell-shaped, 6-cleft perianth, six stamens fixed in the tube of the perianth, and dry capsular fruit.—The *oriental hyacinth* (*H. orientalis*), one of the most favorite of florists' flowers, is a native of Asia Minor, Syria, and Persia. It is now naturalized in some parts of the s. of Europe. It has broad linear leaves, and a scape with a raceme of many flowers pointing in all directions. The flowers in cultivation exhibit great variety of color, chiefly blue, purple, and white. They are very beautiful and very fragrant. The fragrance is strongest about or after eleven o'clock at night. Among cultivated hyacinths are many with double flowers. The hyacinth has been cultivated from a remote period, but about the beginning of the 18th c., it attained almost the first place as a florists' flower. Great attention was bestowed on the produc-

tion of new varieties, and enormous prices were given for bulbs of some of them. A price equal to £200 sterling was sometimes paid for a single bulb. The principal seat of the cultivation of hyacinths was and still is at Haarlem. At present, however, more than £10 is seldom asked for the finest new variety of hyacinth, but although the trade is considered as now much depressed, the Haarlem gardeners still sell bulbs to the value of £2,000 or £3,000 yearly. Hyacinth bulbs, planted in pots, readily produce beautiful flowers; and flowers almost equally beautiful are obtained—for one year, however, only—by placing them in water in hyacinth *glasses*, in which they form a favorite ornament of apartments in winter and early spring. The cultivation of the hyacinth in the open ground is much more difficult. New varieties are raised from seed. Several other species of hyacinth are natives of the s. of Europe, Africa, etc.—The GRAPE-HYACINTH and GLOBE-HYACINTH, frequently cultivated as garden flowers, are now referred to the genus *muscari*.—A common British plant, growing in woods and copses, with beautiful blue flowers very like those of the oriental hyacinth, but all drooping to one side (*H. non-scriptus*, also known as *Scilla nutans*, *Endymion nutans*, and *Agraphis nutans*), is sometimes called the WILD HYACINTH, and sometimes the BLUE-BELL. The bulbs have been used for making starch.

HYACINTHE, PÈRE. See LOYSON, CHARLES.

HYACIN'THUS, in Greek mythology a boy of great beauty, an especial favorite of Apollo, but also beloved by Zephyrus. While playing at discus with Apollo, he was struck and killed by one of the missiles thrown in jealous rage by Zephyrus. Apollo changed him into the flower known by the name hyacinth, on whose petals the Greeks fancied they saw inscribed the name of the unfortunate boy.

HYA-HYA. See COW TREE.

HYALEA, a genus of mollusks belonging to the class *pteropoda*. They are noted for the beautiful transparent glassiness of the texture of their pyramidal shells. See PTEROPODA.

HYANNIS, a seaport village in Barnstable co., Mass., on a branch of the cape Cod railroad; pop. est. 3,300. There are a number of manufactories in the village, a high school, and five churches. It is also a place of summer resort, and is connected with Nantucket by steamboat.

HYBERNA'TION. See HIBERNATION.

HY'BODUS (Gr. *hump-tooth*), a genus of fossil fish, whose teeth and osseous fin-rays are found in all the secondary rocks from the trias to the chalk inclusive. The genus, with the small family of hybodonts to which it belongs, occupy a place between the cestracionts, with their pavement of flat crushing teeth, and the sharks with their sharp-pointed cutting teeth. The teeth of the hybodonts are conical, but broad and blunt; from the body of the tooth rises a large central cone, and several small lateral ones, decreasing in size as they recede from the principal cone. The enamel is strongly marked by longitudinal grooves and folds. The osseous rays of the dorsal fins are the only other preserved portions of these fossils. Like the Port Jackson shark, the hybodus had each of the two dorsal fins furnished with a large and strong spine, one-third of whose length was buried in the flesh. Nearly fifty species of this genus have been described.

HY'BRID (Gr. *hybrid*, from *hybris*, extravagance, licentiousness) is the term applied by naturalists to the offspring of different but generally nearly allied species of animals and plants, and must be distinguished from the word *mongrel*, which is applied to the offspring of different varieties of the same species.

M. Broca, whose memoir on hybridity of animals is the most complete that has yet appeared, remarks that this condition may be (1) natural, (2) excited (*provoquée*), or (3) artificial. The first variety is such as occurs spontaneously amongst animals in their wild state; the second includes those cases in which domesticated animals, which would not naturally cross with one another, do so under the influence of man, and in opposition to their natural instincts; while the third variety is due to the artificial admixture of the male and female generative elements, and as far as is yet known occurs only in fishes, and in the vegetable kingdom. The second variety is by far the most common and the most important.

When the male of the species A can impregnate the female of the species B, it may happen that the process can be inverted, and that the male B can impregnate the female A. In other cases, however, while the male A can readily impregnate the female B, the male B cannot impregnate the female A. In the first case, the hybridity is termed *bilateral;* in the second, *unilateral*. The former is rare, and even when it does occur, the cross in one direction is more common and more productive than in the other. Thus, the ordinary mule, the offspring of the male ass and the mare, is much more readily obtained, and, physiologically, is less imperfect than the corresponding animal, the hinny, which occasionally results from the union of the stallion and female ass. See MULE, HINNY. Our domestic sheep and goats afford an example of the latter (unilateral) kind of hybridity. The union of the he-goat and the ewe is frequently productive, while the union of the ram with the she-goat is always unproductive.

In the present state of our knowledge, it is impossible to predicate in what cases

the crossing of different species will be productive, and in what cases it will be barren. While some closely allied species do not admit of a cross, other species, far more removed from one another, not only yield hybrids, but even fruitful hybrids. There is, however, a limit, beyond which the chance of offspring becomes reduced to zero, and, according to Broca: "If the crossing of animals of different genera is now an incontestable fact, there is no authentic evidence that offspring has resulted from the crossing of animals of different orders."

Cases have been referred to, as showing that animals of different orders may cross, but none of them are satisfactorily established. The strongest apparent case of hybridity between different orders is that of the *jumarts*, which were said to result from the union of the bull and the mare, or of the stallion and the cow. These jumarts were believed in from the time of Columella to that of Buffon, who fully investigated the subject, and found that they were merely hinnies—the offspring of the stallion and the she-ass. Among mammals, hybrids have been obtained between the different species of the genus *equus*. So far as experiments go, the horse, the ass, the zebra, the quagga, etc., breed freely *inter se*, but the degrees of fertility among their offspring have not been fully determined. The dog has been made to breed with the wolf and the fox, the lion with the tiger, the he-goat with the female sheep, the ram with the female roe-deer (*cervus capreolus*), and the hare with the rabbit. (See Professor Owen's article, "Hybrid," in Brande's *Dictionary of Science, Literature, and Art.*) A case was recorded some time ago in *The Field* newspaper, in which a prolific union took place between a mastiff dog and a lioness that had been brought up together.

Among birds, hybridity is not uncommon. The swan will breed with the goose, the grouse with the blackcock, the pheasant with the common fowl, the goldfinch with the canary, etc. Among reptiles, hybrid offspring has been observed between the toad and the frog. Among fishes, hybrids have been obtained by artificial impregnation between different species of the genus *cyprinus*.

Many hybrids have no propagative power, while in others it is so far limited as to admit only of reversion to the original specific form. When a hybrid possesses generative power, it breeds more readily with an individual of one of its parent stocks than with another hybrid like itself. The most remarkable example on record of generative power in hybrids is afforded by the experiments of M. Roux of Angoulême, who finds that he can cross hares and rabbits to any extent, and who has thus, by breeding *leporides*, established a new and lucrative department in agriculture. For a full account of these experiments, which are well deserving of a trial in this country, the reader may consult Brown-Sequard's *Journal de la Physiologie*, vol. ii. pp. 374–83. These experiments have inflicted a severe blow on the popular doctrine of the permanence of species.

Experiments on the hybridization of plants have been very far from confirming the hybrid origin of forms apparently intermediate between other species, and which were once regarded as probably hybrids produced in a state of nature. The interference of man is usually necessary to effect an intermixture, and in many cases in which it has been found possible, it is by no means of easy accomplishment. The predilection for pollen of the same kind appears to be very strong; and if pollen, both of the same and of another kind, is applied to the stigma of a flower, the result is the same as if its own pollen had been there alone. The hybridizer, therefore, must cut away the stamens of the flower of which the pistil is to be impregnated, and carefully prevent all access of pollen other than that which he brings to it. Even with these precautions, it is found impossible to produce hybrids between some plants of the same family, and not very dissimilar.

Hybrid plants are said to partake generally of the characters of the male more than of the female parent. It is more certain that valuable results are often obtained as to size and abundance of fruit, brilliancy of flowers, hardiness, and other qualities. The question of the continued fertility of true hybrids is one having most important relations to the great questions concerning species. Some assert that neither among animals nor among plants are hybrids fertile for more than one or two generations, if kept by themselves; although they are readily fertile with either of the parent species, to which they become again assimilated. But this opinion is controverted, and the question must, of course, be decided by observation of facts, in judging of which, however, questions of no little difficulty must often arise as to what are and what are not different species.

The subject of the hybridization of plants was first investigated, and with great care and very numerous experiments, by Kölreuter, in the end of the 18th c. and has been more recently studied with much attention by Dean Herbert of Manchester, Van Mons, and particularly Gaertner.

HYDASPES. See JHELUM.

HYDATID (from the Greek *hydatis*, a watery vesicle), a term indefinitely applied to several distinct objects of a vesicular or cyst-like character, which are found in the bodies of men and certain mammals. True hydatids were formerly regarded as cystic entozoa (q.v.), such as cysticercus, cœnurus, and echinococcus, but all these animal forms are now discovered to be larval stages of tænia or tape-worm (q.v.). These hydatids may occur in almost any part of the body, and they have been observed in

man, the ape, the ox, the sheep, the horse, the camel, the pig, the kangaroo, and some other vegetable feeders, but they apparently do not occur in carnivorous animals or in the rodents. They are generally inclosed in an external sac, which is attached to the tissue of the organ in which it is situated, and which is frequently common to many hydatids, each of which has a distinct envelope. The fluid in the interior of the hydatid itself is almost always colorless and limpid, but the fluid in the common cyst in which the hydatids float is often of a yellow color. The *cœnurus cerebralis* is found in the brain of various ruminants, and gives rise to the disease in sheep known as "the staggers." When the hydatid occurs in the fourth ventricle, the animal, instead of turning round and round in one direction, springs in the air, and this variety of the affection is hence distinguished by German veterinarians as *das Springen*. Whenever any of the above forms of hydatids are swallowed by man or the lower animals, they may proceed, under favorable circumstances, to be developed into the higher stages of tape-worm. Two species of echinococcus are usually noticed, namely, the *E. hominis*, which has been occasionally met with in the brain and abdomen of man, and the *E. veterinorum*, which is of common occurrence in various parts of the body of the pig, and several other mammals, but it is by no means certain that they are really distinct. These echinococci do not become developed into tape-worms unless they reach the intestinal canal of some animal, by being taken as food; and in ordinary cases of hydatids, consisting of echinococci, the cysts and their contents undergo a kind of degeneration, becoming in some cases converted into fatty or calcareous matter, while in other cases the contents become granular, the peculiar hooklets (which will be described in the article TAPE-WORM) which occur in them, and which remain unaltered for a long time, revealing their true origin.

The so-called acephalocyst, or common globular hydatid, which sometimes attains the size of a child's head, is probably a degenerated or abnormally developed echinococcus.

Hydatids sometimes occasion so little inconvenience, that persons, in whom they are discovered after death, have not suspected any disease in the organ in which they are found. On other occasions, they grow rapidly, and cause so much irritation that suppuration is excited in or around the common sac, which may either burst externally, or into a mucous canal or a serous cavity. In the first or second case, the hydatids will be discharged, and recovery may take place; in the third case, fatal inflammation will ensue. Little can be done for the treatment of this affection, except that occasionally, if the cyst is near the surface, it may carefully be punctured. The means of preventing the affection will be noticed in the article TAPE-WORM.

False hydatids are simple serous cyst, either occurring alone or in clusters, whose mode of origin is not distinctly understood. Structures of this kind, on a small scale, are common in the choroid plexus of the brain, while on a large scale they are found containing the fluid in ovarian dropsy. These false hydatids are also of a comparatively common occurrence in the uterus, which they may distend to such a size as to simulate pregnancy.

HYDE, an important manufacturing town of England, in Cheshire, is situated 7 m. e.s.e. of Manchester, and about the same distance s.e. of Oldham. Until a comparatively recent period, it was a mere village; but since the extension of the cotton-trade, on which it mainly depends, it has rapidly increased in size. Its pop. '71 was 14,223. Besides the numerous cotton-factories, iron, water, and print works are carried on. Coal abounds in the neighborhood. The district in which Hyde is situated is densely peopled, and is furnished with abundant means of communication, by railway and canal, with all the important towns in the vicinity.

HYDE, a co. in Dakotah, on the Missouri river, as yet unorganized. Part of it is an Indian reservation.

HYDE, a co. in e. North Carolina, on Pamlico sound; 600 sq.m.; pop. '70, 6,445—2,378 colored. The surface is level, and the soil sandy. Rice, corn, and pork are the chief products. Co. seat, Swan Quarter.

HYDE, ANNE, 1637–71; daughter of the earl of Clarendon, married clandestinely to the duke of York, over whom she had great influence, even after he became James II. Two of her daughters (Anne and Mary) were queens of England.

HYDE, EDWARD. See CLARENDON, EARL OF.

HYDE, THOMAS, 1636–1703; b. England; a celebrated oriental scholar, educated at Cambridge, and an assistant to Walton in an edition of the *Polyglot Bible*. Besides correcting the Arabic, Syriac, and Persian texts, he transcribed in Persian characters the Persian translation of the Pentateuch that had been printed in Hebrew shortly before at Constantinople, and appended a Latin version of his own. The success with which he accomplished these difficult tasks met the acknowledgment of the most learned men of the age. In 1658 Hyde entered Queen's college, Oxford, to which he was shortly after made Hebrew reader. In the following year, after graduating as M.A., he was chosen underkeeper, and finally librarian-in-chief of the Bodleian library. In 1660 he was made a canon of Salisbury; in 1678 archdeacon of Gloucester. The death of Pococke in 1691 opened up to him the Laudian professorship of Arabic; and soon after,

on the deprivation of Altham, he became regius professor of Hebrew and canon of Christ church. Worn out by his unremitting labors, he resigned his librarianship in 1701, and died two years later. The range of Hyde's erudition in oriental matters was vast. There was hardly an eastern tongue to be learned with which he was not familiar. He even knew Chinese—a language which very few Europeans of that day could boast of knowing. He learned it from Chin-fo-coung, a learned young Chinese brought to England by the Jesuits. His mastery of the more accessible languages of the east, such as Turkish, Arabic, Persian, Hebrew, and Armenian, is proved by his numerous and still valuable works.

HYDE PARK, a noble inclosure of nearly 400 acres, extending from the western extremity of London to Kensington gardens, which derives its name from having been the manor of the Hyde belonging to the abbey of Westminster. It became the property of the crown on the dissolution of the monasteries, in the reign of Henry VIII. A canal or sheet of water, called the Serpentine, although in the form of a parallelogram, was made in Hyde park, between 1730 and 1733, by order of queen Caroline. At the eastern end of it is an artificial waterfall, constructed in 1817. On the s. side are the barracks of the life-guards. It was in Hyde park that the great international exhibition of 1851 was held, in a crystal palace specially erected for the occasion. We do not clearly learn at what time the public began to have free admission to Hyde park. But Ben Jonson speaks of the show of coaches which it presented in his time; and we know that it was constantly resorted to on the morning of May-day for the sports comprehended under the term Maying. Till the middle of the 17th c., there was a part of it which contained deer. About that time it began to be a place for races and military reviews. It was also resorted to for duels. After the restoration it appears to have become the favorite promenade, which it has ever since continued to be. It has, however, undergone many changes of boundary and division; a large part of Kensington gardens has been taken from it, also an angle at the s.e. corner on which Apsley house now stands.

HYDE PARK, a village in Norfolk co., Mass., on the Boston and Providence and the New York and New England railroad, 7 m. from Boston; pop. '80, 7,090. It is a place of residence for Boston business men.

HYDERABAD', more properly HAIDARABAD (from *Haidar*, lion; and *bad*, town), the capital of the nizam's dominions (q.v.), stands on the right bank of the Mussi, in lat. 17° 22′ n., and long. 78° 32′ e., at an elevation of 1800 ft. above the sea, and contains, with suburbs, 200,000 inhabitants. On the opposite side of the river is the British residency, the stream being here bridged by nine spacious arches of squared granite. Besides these erections and the palace of the native sovereigns, we may mention the principal mosque which has been fashioned after the model of the Kaaba at Mecca; while at the meeting of the four principal streets of the city rises another remarkable edifice, with four minarets resting on four connected arches, on which run the four converging thoroughfares. The neighborhood abounds with huge tanks. One of them, close to the British cantonment of Secunderabad, measures 3 m. by 2; and another, still larger, is said to be 20 m. round.

HYDERABAD, the chief city of Scinde, stands 4 m. to the e. of the left bank of the Indus, in lat. 25° 22′ n., and long. 68° 28′ east. Pop. '72, 41,152. The place is famous for the manufacture of arms of various kinds, such as matchlocks, swords, spears, and shields. As against a native force it is tolerably strong, occupying a somewhat steep height, and having a rampart flanked by round towers.

HYDERABAD', a large district in s. India in the Deccan, intersected by many rivers of which Godavery is the chief; 95,337 sq.m.; pop. 11,000,000. It is a high tableland, having a climate unusually cool for its latitude. Cotton and wheat are the chief agricultural products. The manufactures are silk, carpets, and brocades. Cotton and timber are exported. The peninsular railway crosses the s. and e. portions of the district. About 90 per cent of the people are Hindus, though the government is Mohammedan.

HYDER ALI, ruler of Mysore, and one of the greatest Mohammedan princes of India, was born in 1728. His father, who was a gen. of the rajah of Mysore, afterwards obtained Bangalore in fief, and both of these honors descended to his son. Hyder Ali, in 1759, dispossessed his master, allowing him, however, to retain his title, while he himself took that of *daïva*, or regent. He then conquered Calicut, Bednor, Onor, Cananor, and other neighboring states; and in 1766 his dominions included more than 84,000 sq. miles. He waged two wars against the British, in the first of which he was completely successful, and dictated terms of peace under the walls of Madras, but died before the termination of the second, in which he was aided by the French. He also joined in a native confederacy for the expulsion of the British from India. He, besides, withheld the customary tribute from the Mahrattas (q.v.), and waged a successful war against them. In his wars he displayed great resolution and perseverance. He died in 1782. Hyder Ali was remarkable among Asiatic princes for the mildness of his character and government, and was much beloved by his people. He promoted agriculture,

commerce, and the arts, and protected all religions, requiring only submission to his laws. His son and successor was Tippoo Sahib (q.v.).

HYDNO'RA, a genus of plants of the natural order *rhizanthaceæ*. *H. Africana* is a native of South Africa, where it is called *jackal's kost*. It is a parasite chiefly on the roots of large succulent spurges, and is a plant of most extraordinary appearance and structure, resembling a fungus rather than a phanerogamous plant. Its flowers and fruit are entirely concealed in its interior. It has a smell like that of a fungus, or of decaying roast-beef. The South African savages roast and eat it.

HYDNUM, a genus of fungi (*hymenomycetes*), having the under side of the *pileus* covered with soft spines which bears the spores. The species are pretty numerous, some of them British; among which is *H. repandum*, more common in some parts of the continent of Europe, and much used as an esculent in France, Italy, and Germany. It grows on the ground, chiefly in pine and oak woods, either solitary, or in clusters or rings.

HY'DRA, THE, or fresh-water polype, is the type of the class HYDROZOA, which, with the ANTHOZOA, form the sub-kingdom *cœlenterata* of recent zoologists. See ZOOPHYTE.

The hydra possesses a gelatinous, sub-cylindrical body, which, from its contractility, undergoes various alterations of form. One end expands into a disk or foot, which adheres to a leaf, twigs, etc.; while a mouth, surrounded by a circlet of tentacles, varying from five to twelve or more in number, is situated at the opposite end. These tentacles are exceedingly contractile, at one moment thrown out as long delicate threads, at the next, drawn up into minute wart-like knobs. Numerous thread-cells project from their surface, the larger ones possessing a sheath and three recurved darts or barbs, and terminating in a long and extremely slender filament. The mouth leads into a capacious cavity, excavated throughout the whole length of the animal, which, exclusive of its tentacles, seldom exceeds three-fourths of an inch. On minutely examining the hydra, or any member of the class hydrozoa, the body is found to be composed of two membranes, an ectoderm and an endoderm, the former constituting the outer layer of the animal, and having one side always in contact with the water, while the other side is in close contact with the endoderm, whose free surface forms the lining of the great internal cavity. The food of the hydra consists of such minute living organisms as come within the reach of its tentacles, and by these apparently fragile threads, which the animal projects like a lasso, crustaceans, worms, etc., are seized, which would be deemed at first sight superior to their captor in strength and activity. The tentacles appear, however, to possess, through the action of the thread-cells, a powerful benumbing or paralyzing influence, for it has been observed that soft-bodied animals which have succeeded in escaping from the grasp of the hydra frequently die very shortly. The prey, when mastered, but often when still alive, is thrust into the internal cavity, where the nutritive parts are absorbed by the hydra, while the indigestible portions are expelled through the mouth.

Although the hydra is usually found adhering by its circular foot or disk to submerged leaves, twigs, etc., it is not permanently fixed. It often moves on surfaces under water somewhat after the manner of a leech, both ends taking a part in the movement, and occasionally the disk is protruded above the water, and thus acts as a float.

Sometimes, especially in the autumn, true reproductive organs may be observed, both male and female organs being usually situated on the same animal. Propagation by gemmation is, however, the most common mode of increase. Minute tubercles appear on the body of the parent animal, which, as they increase in size, gradually resemble it; becoming perforated at their free extremity, and tentacles gradually being formed. The pedical by which they originate by degrees becomes thinner, and finally gives way, leaving the young hydra perfectly independent. One of the most remarkable points in the history of this animal is its power of being multiplied by mechanical division. If a hydra be cut into two, or even more pieces, every one will, in time, assume the form and functions of the original animal.

Several species of hydra such as *H. viridis*, *H. vulgaris*, *H. fusca*, etc., have been described, which differ in size, color, etc. When living hydræ are removed from the water, they appear like minute specks of jelly, which quickly recover their true form on being restored to their proper element. The great authority on these singular animals is Trembley, whose *Mémoires pour servir à l'histoire d'un Genre de Polypes d'eau douce* was published in 1744.

HYDRA, a fabulous monster of the ancient world, said to have inhabited the marshes of Lernæa, in Argolis, not far from the sea-coast. Accounts vary both as to its origin and appearance. Some make it the issue of Styx and the Titan Pallas, and others, of Echidna and Typhon. It is represented as having several heads, which immediately grew up again as often as they were cut off. The number generally ranged from seven to nine, though Simonides gives it fifty, and certain historians a hundred, and even more. Its mouths, which were as numerous as its heads, discharged a subtle and deadly venom. The destruction of this reptile was one of the twelve labors of Hercules (q.v.).

HYDRA, an island of Greece, is situated off the eastern shore of the Peloponnesus (now the Morea), about 5 m. distant from the coast of the department of Argolis and Corinth. It is about 13 m. long and 3 m. broad, and has an area of 38 sq. miles. The shores are rocky and steep, and the interior, rising to about 1800 ft. in height, is destitute of vegetation and of water. On the n.w. coast is the town and seaport of Hydra, the white, flat-roofed houses of which, ascending from the harbor, climb up the side of a hill. The streets, owing to the irregularity of the site, are steep and uneven, but remarkably clean. This town, the only one in the island, is one of the most beautiful in the whole of Greece. Pop. '71, 11,684, who are chiefly employed in cotton and silk weaving, in tanning, and in commerce.

The island of Hydra was uninhabited in ancient times. The nucleus of the town was formed by a few fishermen and peasants, who, suffering from the oppression of the Turks, crossed over from the neighboring mainland, and were afterwards followed by crowds from Albania, Argolis, and Attica, in the 15th and 16th centuries. In the Grecian war of independence the Hydriotes took a most active part; and none were more liberal in their contributions to the patriotic cause. In 1825 the population was estimated at 40,000, and about that time the islanders were considered the richest in the archipelago. They possessed exclusively the carrying-trade of the Black sea and the Mediterranean, and traded to England, the Baltic, and even America. Since the revolution, however, more accessible ports have risen to be the centers of Greek commerce, and Hydra has considerably declined.

HYDRA'CIDS, or HYDROGEN ACIDS, a name given to acids in which the acidifying principle was supposed to be hydrogen. See ACIDS. The division of acids into *oxyacids* and *hydracids* belongs rather to a past than to the present state of chemistry.

HY'DRAGOGUES are those active purgatives which produce a great flux from the intestinal membrane, and which consequently give rise to very watery stools. They are of extreme use in some of the varieties of dropsy, being the most effectual means of diminishing the liquid poured into the cellular tissue and serous cavities of the body.

Jalap (especially when combined with bitartrate of potash) and elaterium, a medicine which, from its extreme power, must be given in very small doses (one-eighth to one-third of a grain), and with great caution are perhaps the best examples of this class of purgatives.

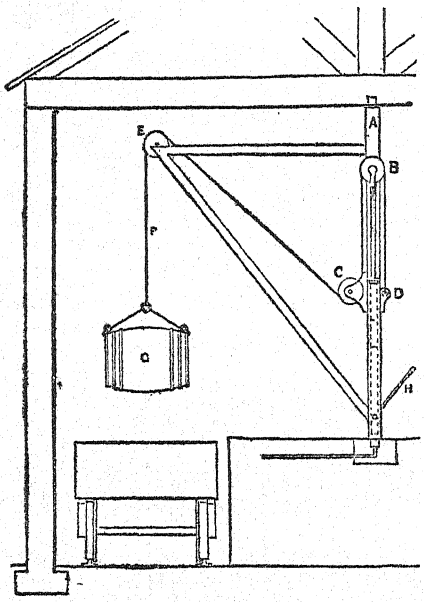
HYDRAN'GEA, a genus of plants of the natural order *hydrangeaceæ*, which many botanists make a suborder of *saxifrageæ*, distinguished by having 4 to 6 petals, 8 to 12 or many stamens, a more or less inferior ovary, and 2 to 5 styles. *Hydrangeaceæ* are shrubs with opposite, or sometimes whorled leaves, destitute of stipules. In the genus hydrangea the flowers are in cymes, the exterior flowers sterile and dilated. Few species are known, and they are chiefly natives of the southern parts of North America, and of China and Japan. The species popularly known as the HYDRANGEA (*H. hortensia*), is a native of China and Japan, and has long been in cultivation there as an ornamental plant. It was introduced into Britain by sir Joseph Banks in 1788, and speedily became very popular, being readily propagated by layers and cuttings, so as to be not only a favorite green-house plant, but a frequent ornament of cottage windows. In the s. of England, it endures the open air. It seems almost impossible to water it too freely; a large plant has been known to receive with advantage one hundred gallons of water daily; and in favorable circumstances, it becomes a magnificent shrub. A plant in Devonshire has had 1,000 large cymes of flowers expanded at once. The flowers, generally pink, are sometimes blue; the blue color is owing to peculiarities of soil. Peat and iron ore are said to be productive of blue flowers in the hydrangea.—*H. Japonica*, introduced into Europe from Japan by Siebold, is remarkable for its very large cymes of flowers.—*H. nivea* and *H. quercifolia*, American species, are not unfrequently to be seen in flower-gardens in North America.

HYDRAS'TIS, or WARNERIA, a genus of plants of the natural order *ranunculaceæ*, allied to *anemone*, but having flowers destitute of petals, and succulent or *baccate* fruit, collected into a head. The only known species, *H. canadensis*, a perennial herbaceous plant, with tuberous roots, and head of fruit resembling a raspberry, is common in watery places in Canada, and among the Alleghanies, as far s. as Carolina. Its root is used for dyeing yellow, and also in medicine as a tonic. YELLOW ROOT and ORANGE ROOT are its American names.

HY'DRATES are substances in which a definite quantity of water is chemically combined with a definite quantity of some other constituent. Although water is a perfectly indifferent substance, possessing neither acid nor basic properties, yet it enters into combination both with acids and with bases, and thus forms the bodies termed hydrates. Thus, when an acid has once been allowed to combine with water, the entire separation of the water can usually only be effected by the presence of some strong base, which displaces the water. If, for example, we distill diluted sulphuric acid, water is expelled up to a certain point, when both acid and water are distilled together. The liquid now contains one equivalent of water, and one of acid (HO,SO_3), and is termed hydrated sulphuric acid, and this equivalent of water can only be displaced by an

equivalent of potash, or some other base. Hydrate of baryta (BaO,HO), hydrate of lime or slaked lime (CaO,HO), hydrate of sesquioxide of iron (Fe_2O_3,3HO), and hydrate of oxide of copper (CuO,HO), are similar cases, except that here the water is displaced by an acid instead of a base. The above are examples of hydrates of acids and bases or oxides. Gypsum (CaO,SO_3,2HO) is an example of a hydrate of a salt.

HYDRAULIC CRANES have come into very extensive use within the past few years. Wherever a large number of cranes have to be worked near each other, water-pressure is by far the most manageable, economical, and convenient mode of working them. Sir W. Armstrong & Co., of Newcastle, have taken the lead in introducing this kind of machinery. They have fitted up a great many railway goods stations with complete systems of hydraulic cranes.



The figure represents one of the simplest forms of hydraulic cranes, such as are in use for loading goods in a railway station. It is made entirely of iron, and consists of two upright cheeks, A, between which there is fixed a hydraulic ram (similar to that used in the hydraulic press), occupying the lower half of the upright frame A. The upper end of this ram carries a pulley B. A similar pulley is fixed to the upright frame at C. A chain is secured to a bracket, D, on the upright frame. This chain passes up over the pulley B, down and under the pulley C, and then over the pulley E, on the end of the jib of the crane. It is obvious that the rising and falling of the ram will cause the chain, F, to ascend and descend with its load G.

The ram is forced to ascend by the admission of water under great pressure by the handle H, which serves also to allow the water to flow out after it has done its work, and the ram descends by its own weight, allowing the chain, F, to run down with or without a load on it.

The pressure usually employed in working hydraulic cranes is greatly in excess of the pressure admissible in the case of steam. Six or seven hundred pounds to the sq. in. is usually employed as the working-pressure. It is got up to this great pressure by means of an arrangement called an accumulator, which consists of a large hydraulic ram of 16 or 18 in. in diameter, carrying a wrought-iron cylinder. This cylinder is filled with stones or gravel to the weight of 60 or 70 tons. A powerful horizontal steam-engine forces water into a cylinder and slowly raises the ram with its enormous load. Pipes lead away from the cylinder to the cranes in the different parts of the station, and are thus supplied with water under the great pressure caused by the load forcing the ram into the cylinder. The load is constantly rising and falling a little as the cranes draw their supplies from the cylinder. If the cranes were supplied direct from the force-pumps of the steam-engine, without the intervention of this accumulator, their action would be jerky and unsteady. The accumulator acts as a reservoir of power, and when it happens that a great number of cranes are drawing off water at the same moment, and in excess of what the engine force-pumps can supply, the ram descends, keeping up the while the full 700 lbs. pressure; and then, when the cranes are demanding less abundant supplies, the engine overtakes its work, and sends the ram up again. When it arrives at the top it touches a lever communicating with the throttle-valve of the engine, and thus slows or stops the engine when the accumulator has mounted to its maximum height. The moment it begins to descend, the lever is relieved, the throttle-valve opens, and the engine goes on again with such speed as the work demands.

It is easily seen that when the pulley rises any given distance, the weight will, at the same time, rise *double* that distance, because it raises a double length of chain; and, in the same way, by passing the chain twice, thrice, or any greater number of times over the pulleys, the weight can be made to travel any number of times further than the ram. It is, in fact, the reverse action of a block and tackle. If the block is made to move, the *fall* will move further than the block in proportion to the number of times the rope passes over the sheaves. This kind of arrangement is adopted when it is desired to lift anything to a considerable height, such as grain to upper floors of a warehouse. There is, of course, a diminution in the weight the machine can hoist, in proportion to the excess of travel of the load to that of the ram.

The hydraulic lifts, or ascending rooms, now in use in many large hotels, are con-

structed on the same plan as the accumulator. A cylinder is sunk 60 or 70 ft. into the ground, thus admitting a ram of nearly equal length to rise out of it, on a sufficient pressure of water being forced into it by a steam-engine. The ascending room takes the place of the loaded cylinder. Balance weights are attached to the ascending room, to steady its movements and to guard against any failure in the mechanism. A rope passing from bottom to top of the channel, through which the ascending room rises, affords to the person in the room the means of regulating its movements.

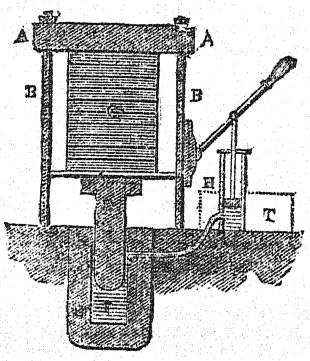
HYDRAULIC ENGINES are sometimes used where water under high-pressure is obtainable. They do not differ in any essential particular from a steam-engine. As the pressure under which they work is from five to ten times greater than that of a steam-engine, they are much smaller. One form of hydraulic engine is described under the head of WATER-POWER. Another common form is that of three small cylinders in which three plungers work. The water is admitted into the cylinders by means of valves, and forces the plungers outwards. These plungers are connected with a three-throw crank; and when they have completed their outward travel, or working-stroke, the water is allowed to escape from the cylinder; the plunger then slides inwards, to be again forced outwards by a fresh rush of water admitted at the proper instant into the cylinder by the action of the valve.

HYDRAULIC FORGING, forging with the hydraulic-press instead of the hammer and anvil. The process is analogous to that of rolling. The advantages claimed for the process are that it is, in many operations, more expeditious than the ordinary modes, and also that it produces a better structural condition of the particles of the material, the force being less superficial than the sudden impact of a hammer, and moving the particles of matter near the center to a greater extent, thus rendering the forged bar more homogeneous. Every forger and observant person has noticed that in the ordinary mode of forging a bar of iron there is, when the bar is thick enough, a protrusion of material at the edges, leaving a groove in the middle of the thickness, because of the superficial parts of the bar having received the greatest spread. Rolling or forging by pressure avoids this. Forging by hydraulic pressure is practiced in Europe. At Vienna there are several presses in operation, one with a piston 24 in. in diameter, transmitting a pressure of 2,400,000 lbs.

HYDRAULIC JACK, a machine which often takes the place of the jack-screw for raising heavy weights. It is simply a form of hydraulic press, which may be placed beneath a house, or ship, or any great weight which it is desired to raise—generally consisting of a stout frame furnished with upright grooves, in which a follower may be forced upwards by a hydraulic cylinder. By proper appliances the power may be rendered almost immeasurably great. See HYDRAULIC PRESS and JACK-SCREW.

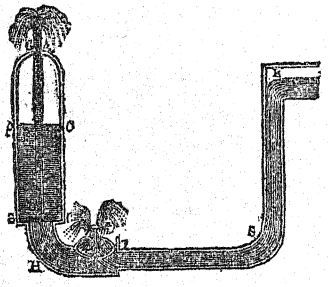
HYDRAULIC LIMES. See CEMENTS.

HYDRAULIC PRESS, called also Bramah's press, from the name of its inventor, depends on the principle, that a pressure exerted on any part of the surface of a liquid is transmitted undiminished to all parts of the mass, and in all directions. See HYDROSTATICS. The annexed figure represents the essential parts of the machine, the details of construction being omitted. F is the cavity of a strong metal cylinder E, into which the piston, D, passes water-tight through the top. A tube, G, leads from the cylinder to a force-pump H; and by means of this water is driven from the tank T into the cavity F, so as to force the piston, D, upwards. The piston supports a table on which are placed the bales, books, or other articles to be pressed; and the rising of the table presses them against the entablature AA, which is fastened to the pillars B B. The power of the press is readily calculated. Suppose that the pump has only one-thousandth of the area of D, and that, by means of its lever-handle, the piston of the pump is pressed down with a force of 500 lbs., the piston of the barrel will rise with a force of one thousand times 500 lbs., or more than 200 tons. The rise, however, will be slow in proportion to the power. The enormous multiplying power given by this machine has been employed for a great variety of useful purposes, such as compressing bales of cotton, paper, etc., expressing oils, bending iron plates and bars, and raising weights. This was the means employed for launching the *Great Eastern* at Millwall, and for raising to their position the tubes of the Britannia bridge.



HYDRAULIC RAM, a simple and conveniently applied mechanism, by which the momentum or weight of falling water can be made available for raising a portion of itself to a considerable height. In the annexed figure, which represents a section of Montgolfier's hydraulic ram, R is the reservoir from which the water falls, RS the height of the fall, and ST the horizontal tube which conducts the water to the engine ABHTC.

E and D are two valves, the former of which closes its cavity by ascending, the latter by descending; and FG is a pipe reaching within a very little of the bottom CB. The valves are such that the water at its normal pressure cannot support their weight; the valve E is prevented from falling below a certain point by a knob above *mn*. When the water is allowed to descend from the reservoir, after filling the tube BHS, it rushes out at the aperture *mn*, till its velocity in descending RST becomes so great as to force up the valve E, and close the means of escape. The water being thus suddenly checked, and unable to find a passage at *mn*, will produce a great action on every part of the containing vessels, and by its momentum raise the valve D. A portion of water being admitted into the vessel ABC, the impulse of the column of fluid is expended, the valves D and E fall; the opening at D being thus closed, and that at *mn* opened. The water now rushes out at *mn* as before, till its motion is again stopped by its carrying up the valve E, when the operation is repeated, the fluid impulse opening the valve at D, through which a portion of the water passes into ABC. The valves at E and D thus alternately closing and opening, and water at every opening of D making its way into ABC, the air therein is condensed, for it has no communication with the atmosphere after the water is higher than the bottom of the pipe FG. This condensed air, then, exercises great force on the surface, *op*, of the water, and raises it in the tube, FG, to a height proportioned to the elasticity of the imprisoned air. The principles of the hydraulic ram are susceptible of a very extensive application. In well-constructed rams, the mechanical effect obtained has been found to be about two-thirds of the energy in the falling water. For raising comparatively small quantities of water, such as are necessary for the supply of single houses, farm-yards, etc.—where water at the lower level is plentiful and cheap—the hydraulic ram is a most useful piece of mechanism. Its details have been greatly improved since the time of Montgolfier.



HYDRAULICS. See HYDRODYNAMICS and HYDROSTATICS, *ante*.

HY'DRIDÆ, a family of serpents, sometimes so defined as to include numerous fresh-water snakes which are not venomous, and sometimes limited to venomous sea-serpents, inhabiting the Indian, Chinese, and tropical Australian seas. These sea-serpents, forming the genus *hydrophis* (or *hydrus*), and other genera recently separated from it, have the tail compressed and the belly keeled, so that they have the power of swimming like eels; they have small heads and small eyes; they are remarkable for the large size of their nasal shields; they are generally of a yellowish-green color, varied with blackish rings or lozenge-shaped spots. Their lungs are often prolonged into a reservoir of air as far as the commencement of the tail. They are often from 2 to 5 ft. long. They are frequently seen asleep on the surface of the sea, and are easily caught in this condition, in which, apparently, they often fall a prey to sharks. They are supposed to live on small fishes and crustaceans. They are sometimes found coiled up among seaweed on the shore, and are much dreaded by fishermen. In some places they are very numerous. One species, at least, is esteemed good food by the Tahitians. More than 50 species are known.

HY'DRIDES. This term is applied both to combinations of hydrogen with metals, and to similar combinations with organic or compound radicals. Hydrogen forms hydrides with at least four metals—viz., arsenic, antimony, copper, and potassium. The first two of these are the well-known gases, arseniuretted hydrogen (AsH_3) and antimoniuretted hydrogen (SbH_3). The hydride of methyl or marsh-gas (C_2H_3,H), and the hydride of ethyl (C_4H_5,H), are examples of the second variety of hydrides.

HYDROCAR'BONS. See CARBOHYDROGENS.

HY'DROCELE (Gr. *hydor*, water, and *kēlē*, a swelling) is the medical term for a dropsy of the tunica vaginalis, a serous membrane or sac investing the testis. Hydrocele occurs as a smooth, pear-shaped swelling, fluctuating when pressed, devoid of pain or tenderness, but sometimes causing a slight uneasiness from its weight.

The quantity of serous fluid in the sac is usually from 6 to 20 oz., but it occasionally exceeds 100 ounces. Hydrocele may occur as a result of acute inflammation, but it most commonly comes on without any apparent local cause. It is most frequently met with about or beyond the middle period of life, and generally in persons of feeble power, or with a tendency to gout; sometimes, however, it occurs in young children, either in the same form as in adults, or as what is termed *congenital hydrocele*, when the communication between the tunica vaginalis and the abdominal peritoneum is not obliterated, as it normally should be.

The treatment is divided into the *palliative* and the *curative*. By the former, the surgeon relieves the present annoyance of his patient, while by the latter he aims at the

permanent removal of the disease. The palliative treatment consists in the use of suspensory bandages, evaporating and discutient lotions, and tapping with a fine trochar. Tapping seldom gives more than temporary relief, the swelling usually again regaining its former bulk in three or four months.

The curative treatment consists in setting up sufficient inflammation in the tunica vaginalis to destroy its undue secreting faculty. This is most commonly done by the injection of tincture of iodine into the sac, or by the passage of a fine seton or an iron wire (as proposed by Dr. Simpson) through it.

HYDROCEPH'ALUS. Under this term, which literally means *water in the head*, are included three distinct diseases—viz., acute hydrocephalus, chronic hydrocephalus, and spurious hydrocephalus, or, as Dr. Marshall Hall termed it, hydrocephaloid disease.

By *acute hydrocephalus* is signified inflammation of the brain as it usually occurs in scrofulous children. The name is not a good one, because it merely refers to a frequent effect of the disease, and not to its cause or essence; and because, further, a similar effect may result from other morbid conditions; it is, however, so universally adopted, that it would be inexpedient to change it. The disease is one of so dangerous a nature, that it is of the greatest importance to detect it in its earliest stage, and even to look out for indications of its approach. The premonitory symptoms (which, however, do not occur in all cases) consist chiefly in a morbid state of the nutritive functions. The appetite is capricious, the tongue foul, the breath offensive, the belly enlarged, and sometimes tender, and the evacuations unnatural; and the child is heavy, languid, and dejected, and becomes either fretful and irritable, or drowsy and listless. Restless sleep attended by grinding of the teeth or moaning, a frequent sudden scream, clenching of the fists, and a turning in of the thumb towards the palm of the hand, are also important premonitory warnings.

After these symptoms have lasted for some days, severe pain in the head comes on, it is generally of a sharp shooting character, recurring at intervals, and often during sleep, and causing the child to shriek in a very characteristic manner. Coma or morbid drowsiness now supervenes, and the shrieking is replaced by moaning. Vomiting is a frequent concomitant of this stage of the disease. In this first stage of hydrocephalus, which most commonly lasts two or three days, the pulse is rapid, and the symptoms generally are those of excitement. In the second stage, the pulse becomes irregular, variable, and often slow. General heaviness and stupor come on. The light, which annoyed the child in the first stage, is no longer a source of annoyance; the pupils become dilated, the power of sight becomes imperfect or lost, and squinting is almost always to be observed. The little patient now lies on his back in a drowsy condition; and at this period spasmodic twitchings, convulsions, or paralysis may come on. The excretions are passed unconsciously. This second stage may last a week or two, and is often attended by deceptive appearances of amendment, the child not unfrequently regaining the use of its senses for a day or two, but then relapsing into a deeper stupor than before. The symptoms in the third or last stage, which may last only a few hours, or may extend to a fortnight, are very similar to those in the second, except that the pulse again becomes very rapid, beating sometimes so quickly that it can scarcely be counted, and gradually gets more and more weak, till the patient expires. The characteristic appearances after death are softening of the central part of the brain, with the effusion of serous fluid, usually to the extent of several ounces, into the ventricles; and a tubercular deposit, in the shape of small granules, upon or between the membranes of the brain.

The only disorder with which acute hydrocephalus can easily be confounded is infantile remittent fever; but we have not space to notice the various points which enable us to discriminate between these two complaints. Acute hydrocephalus is essentially a disease of childhood; it scarcely ever occurs after the twelfth year. Half the cases that occur are in children between three and six years of age.

As the treatment should be left entirely to the physician, it is unnecessary to notice it further than to state that strong antiphlogistic remedies—such as cold to the head, leeching, and active purging—applied in the first stage of the disease, yield the most satisfactory results; yet under this treatment, three cases out of four are lost.

Chronic hydrocephalus is a perfectly distinct disease from acute hydrocephalus; while the latter is an inflammation, the former is a dropsy. In chronic hydrocephalus, a watery fluid collects within the skull, before the bones have united to form the solid brain-case, and by pressure outwards causes the bones to separate, and increases the size of the head sometimes to an enormous extent. Thus Dr. David Monro relates the case of a girl six years old whose head measured 2 ft. 4 in. in circumference. While the skull is rapidly enlarging, the bones of the face grow no faster than usual, and the great disproportion of size between the head and the face is at once diagnostic of the disease. This disorder sometimes commences before birth, and almost always in early childhood, before the fontanelles and sutures of the skull have closed. In some rare cases, it has occurred later, as, for example, at seven or nine years old, and the closed sutures have opened under the augmenting pressure. When the sutures will not yield, death from pressure on the brain speedily ensues. Most children with chronic hydrocephalus either recover or die in infancy; but a few survive, bearing their complaint to adult life, or even to old age. Blindness, deafness, palsy, and idiocy—one or more—

are commonly associated with this disease, but occasionally the intellect and senses are sufficiently perfect for the ordinary requirements of social life.

The treatment may be attempted by internal remedies or by surgical appliances. The medical treatment most worthy of trial consists in the administration of diuretics, purgatives, and especially mercury, which may be given in the form of calomel in minute doses, and applied as ointment externally. The surgical expedients are bandaging and puncturing the head. The former has in some cases effected a permanent cure; the latter has in many cases certainly prolonged life, although the disease has finally conquered. Neither of these means is applicable after the bones of the skull have united.

This disease occasionally occurs in adult or in advanced life, after enlargement of the head has become impossible. Stupor, paralysis, and an inability or unwillingness to speak, are in these cases the most prominent symptoms. Dean Swift's death was due to this disease, and it is recorded that during the last three years of his life he remained in a state of silence, with few and slight exceptions.

Spurious hydrocephalus—the *hydrocephaloid disease* of Dr. Marshall Hall—resembles acute hydrocephalus in many of its symptoms, and has often been mistaken for it. Instead, however, of being an inflammatory disease, it is a disease of debility, and is due to a deficient supply of blood to the brain. The following are, according to Watson, the distinctive characters of this spurious hydrocephalus: the pale, cool cheek, the half-shut, regardless eye; the insensible pupil; the interrupted, sighing respiration; and the state of the unclosed fontanelle. If the symptoms are those of acute hydrocephalus, the surface of the fontanelle will be convex and prominent; while if they are due to spurious hydrocephalus, and originate in emptiness and want of support, the fontanelle will be concave and depressed. The remedies in this disease, which readily yields to treatment, are nourishing diet, small doses of wine or even of brandy in arrow-root, decoction of bark, ammonia, etc.

HYDROCHARI'DEÆ, or HYDROCHARIDA'CEÆ. See ANACHARIS and VALLISNERIA.

HYDROCHLOR'IC ACID (symbol, HCl; equivalent, 36.5) is one of the most important compounds in inorganic chemistry. If the two gases which enter into its composition (hydrogen and chlorine) be mixed in equal volumes, they will remain without action upon each other, if kept in the dark; but as soon as they are brought into direct sunlight, they unite with a loud explosion, and hydrochloric acid gas is the result. The principal characters of this gas are that it is colorless, intensely acid, irrespirable, and even, when largely diluted, is very irritating to the lungs and eyes, and very injurious to vegetation; that it is heavier than air (its specific gravity being 1.2474, air being taken at 1.000); that it can be condensed into a colorless liquid; that it is very soluble in water, and that it is neither combustible nor a supporter of combustion. When allowed to escape into the air, it produces white fumes, by condensing the atmospheric moisture. If the air be previously dried, no such fumes are apparent.

The solutions of this gas in water form the acid which was first known as *spirit of salt*, then as *muriatic acid*, and which is now termed *hydrochloric* or *chlorhydric acid*. A saturated watery solution of this gas at 40° has a specific gravity of 1.21, and consists of 1 equivalent of the gas dissolved in 6 equivalents of water. It forms a colorless, fuming liquid, which acts as a caustic. On heating it, the gas is evolved abundantly until the temperature slightly exceeds 212°, when there distills over a diluted solution, having a specific gravity of 1.1, and consisting of 1 equivalent of the gas, and 16 equivalents of water. It is to these solutions of hydrochloric acid that the term *hydrochloric acid* is far more commonly applied than to the gas itself. They possess the ordinary characters of an energetic acid, and neutralize the strongest bases. The neutralization is, however, not in consequence of the acid combining with the oxide, but is due to the simultaneous decomposition of the acid and of the oxide, water and a metallic chloride being formed. If M represents the metal, the reaction is expressed by the equation $MO + HCl = MCl + HO$. All metals which, at a red heat, decompose water, also decompose this acid, and cause an evolution of hydrogen, the reaction being expressed as follows: $M + HCl = MCl + H$.

Hydrochloric acid gas is a common gaseous volcanic product. Free hydrochloric acid, in a very dilute form, is also a constituent of the gastric juice of man and animals, and plays an essential part in the digestive process.

Commercial *muriatic acid*—to use the name employed by manufacturing chemists—is made by heating, in iron cylinders, common salt (chloride of sodium) and oil of vitriol (hydrated sulphuric acid), and condensing the evolved gas in water contained in a series of stoneware Wolffian bottles (q.v.), the reaction being explained by the equation:

Chloride of Sodium.		Oil of Vitriol.		Hydrochloric Acid.		Sulphate of Soda.
$ClNa$	+	HO,SO_3	=	HCl	+	NaO,SO_3

This commercial acid may contain various impurities—as, for example, iron (which gives it a bright deep yellow color), the chlorides of sodium and arsenic—the latter being derived from the oil of vitriol—sulphuric and sulphurous acids, chlorine, etc.; from which it can be purified to a great extent by dilution and redistillation. "If pure," says prof. Miller, "the acid should leave no residue when evaporated; on satur-

ating it with ammonia, it should give no precipitate of oxide of iron; sulphureted hydrogen should produce no turbidity in it, which would be the case if arsenic, free chlorine, or sulphurous acid were present; and on dilution with three or four times its bulk of water no white cloud of sulphate of baryta should be produced by the addition of chloride of barium."

The presence of hydrochloric acid, or of the soluble chlorides in solution, may be detected by the addition of a few drops of a solution of nitrate of silver, which occasions the formation of a white curdy precipitate of chloride of silver, which is insoluble in nitric acid, but dissolves in a solution of ammonia.

Liquid hydrochloric acid (under the name of spirit of salt) was known to the alchemists. Hydrochloric acid gas was discovered by Priestley in 1772; and Davy, in 1810, ascertained that it was composed of chlorine and hydrogen.

In many of their properties, the analogous acids, hydrobromic, hydrofluoic, and hydriodic acids resemble hydrochloric acid.

HYDROCOTYLE, a genus of umbelliferous plants, having simple umbels, entire acute petals, and fruit of two flat orbicular carpels, with five more or less distinct threadlike ribs, and no vittæ. The species are numerous, generally more or less aquatic, widely distributed. One only is a native of Britain, *H. vulgaris*, which grows in marshy places, and is called marsh pennywort from the orbicular leaves, and sometimes white-rot, sheeps-bane, flowk-wort, etc., from a notion that it is injurious to sheep which eat it, causing foot-rot or fluke-worm—effects rather to be ascribed to the marshy situations in which it grows.

HYDROCYANIC ACID (C_2N,H or Cy,H), known also as prussic acid, from its having been first obtained by Scheele, in 1782, from the substance known as Prussian or Berlin blue, is of almost equal interest to the chemist, the physician, and the toxicologist. We shall notice (1) its chemistry, (2) its medicinal value, and (3) its action as a poison, and its antidotes.

1. *Its Chemistry.*—Pure anhydrous hydrocyanic acid is a limpid volatile fluid, with a specific gravity of 0.697 at 64° F. It boils at 80°, and solidifies into a crystalline mass at 5° F. Its volatility is so great that if a drop be allowed to fall on a piece of glass, part of the acid becomes frozen by the cold produced by its own evaporation. It possesses a very penetrating odor, resembling that of peach-blossoms or oil of bitter almonds. It burns with a whitish flame, reddens litmus paper slightly (its acid properties being feeble), and is very soluble in water and alcohol. Pure hydrocyanic acid may be kept unchanged if excluded from light, which occasions its decomposition, and the formation of a brown substance known as paracyanogen.

Hydrocyanic acid is readily obtained by distillation from the kernels of bitter almonds, and many kinds of stone-fruit, from the leaves and flowers of various plants, and from the juice of the tapioca plant (*jatropha manihot*). Anhydrous hydrocyanic acid is obtained by the reaction of concentrated hydrochloric acid on cyanide of mercury.

The preparation of the dilute acid is, however, of much greater practical importance. The London, Edinburgh, Dublin, and United States pharmacopœias agree in recommending that it should be obtained by the distillation of a mixture of dilute sulphuric acid and ferrocyanide of potassium (known also as prussiate of potash). The distillate should contain nothing but hydrocyanic acid and water, so that, by the addition of more water, we can obtain an acid of any strength we please. Sometimes, however, a second, or even a third distillation is necessary. The dilute acid of the *Ph. Lond.* contains 2 per cent; that of the *Ph. Dub.* rather more; that of the *Ph. Edin.* contains 3.3 per cent; while what is known as Scheele's acid is very variable, but averages 4 per cent of the anhydrous acid.

The ordinary tests for hydrocyanic acid are 1, the peculiar odor; 2, the nitrate of silver test—there being formed a white precipitate of cyanide of silver, which is soluble in boiling nitric acid; 3, the formation of Prussian blue, by adding to the fluid under examination a solution of some proto and per-salt of iron, by then saturating with caustic potash, and finally adding an excess of hydrochloric acid; when, if hydrocyanic acid is present, we have a characteristic blue precipitate; 4, the sulphur test, which is the best and most accurate that has yet been discovered. Let the suspected liquid be acidulated with a few drops of hydrochloric acid; place it in a watch-glass, and let a second watch-glass, moistened with a drop of a solution of hydrosulphate of ammonia, be inverted over it; after a few minutes, let the upper glass be removed, and the moistened spot be gently dried. The whitish film which is left may consist merely of sulphur; when hydrocyanic acid is present, it consists of sulphocyanate of ammonia. Let this residue be treated with a drop of a weak solution of perchloride of iron, when, if hydrocyanic acid was present, a blood-red tint is developed, which disappears on the addition of one or two drops of a solution of corrosive sublimate. This is known as Liebig's test.

2. *Its Medicinal Uses.*—We are indebted to the Italians for the introduction of hydrocyanic acid in the materia medica; and it was first employed at the beginning of the present century. There are no cases in which it is so serviceable as in those affections of the stomach in which pain is a leading symptom, as in gastrodynia, water-brash, and

in cases of intense vomiting. Hence it is often useful in English cholera, when opium has completely failed. In pulmonary diseases it does not produce the good effects that were formerly ascribed to it; but it is sometimes useful in allaying spasmodic cough. It has been employed with advantage in chronic skin-diseases, to allay pain and irritation. A mixture of two drams of the dilute acid (of 2 per cent strength) with half a pint of rose-water, and half an ounce of rectified spirit, forms a good lotion. When given internally, the average dose is from 3 to 5 minims of the 2 per cent dilute acid, three or four times a day; it must be administered in some milk vehicle, such as simple water, or orange-flower water.

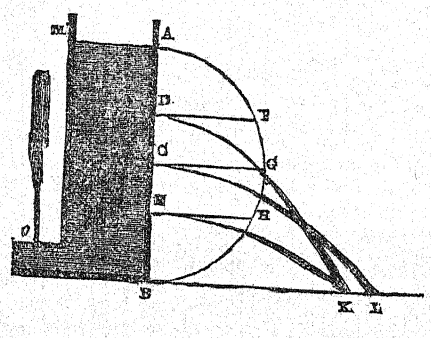
3. *As a Poison.*—Hydrocyanic acid is one of our most energetic poisons, and is frequently employed both in murder and suicide. When a *small* poisonous dose (about half a dram of the 2 per cent acid) has been taken, the first symptoms are, weight and pain in the head, with confusion of thought, giddiness, nausea (and sometimes vomiting), a quick pulse, and loss of muscular power. If death result, this is preceded by tetanic spasms and involuntary evacuations. When a *large* dose has been taken (as from half an ounce to an ounce of the 2 per cent acid), the symptoms may commence instantaneously, and it is seldom that their appearance is delayed beyond one or two minutes. "When," says Dr. A. S. Taylor, "the patient has been seen at this period, he has been perfectly insensible, the eyes fixed and glistening, the pupils dilated and unaffected by light, the limbs flaccid, the skin cold and covered with a clammy perspiration; there is convulsive respiration at long intervals, and the patient appears dead in the intermediate time; the pulse is imperceptible, and the respiration is slow, deep, gasping, and sometimes heaving or sobbing." The patient survives for a longer or shorter period, according to the dose. According to Dr. Lonsdale, death has occurred as early as the *second*, and as late as the *forty-fifth* minute.

The parts specifically affected are the brain and the spinal system. The affection of the respiratory system seems to be due to the influence of the acid on those parts of the nervous system from which the respiratory organs derive their nervous power. The immediate cause of death is, in most cases, the obstruction of the respiration; but in some cases, the stoppage of the heart's action.

Where the fatal action is so rapid antidotes are of comparatively little value. Chlorine, ammonia, cold affusion, and artificial respiration are the most important agents in the treatment. The first two should be used with great caution, and only by the medical practitioner. Cold affusion on the head, neck, and down the spine is a valuable remedy, and it is asserted that its efficacy is almost certain when it is employed before the convulsive stage of poisoning is over, and that it is often successful even in the stages of insensibility and paralysis. Artificial respiration (see RESPIRATION, ARTIFICIAL) should never be omitted. Dr. Pereira states that he once recovered a rabbit by this means only, after the convulsions had ceased, and the animal was apparently dead.

HYDRODYNAMICS treats of the laws of the motion of liquids; the flow of water from orifices and in pipes, canals, and rivers; its oscillations or waves; and its resistance to bodies moving through it. The term hydraulics is sometimes applied to the same subjects, from the Greek word *aulos*, a pipe. The application of water as a moving power forms the practical part of the subject.—In what follows, the illustration is taken from the case of water, but the principles established are true of liquids in general.

Efflux.—If three apertures, D, C, E, are made at different heights in the side of a vessel filled with water, the liquid will pour out with greater impetuosity from C than from D, and from E than from C. The velocity does not increase in the simple ratio of the depth. The exact law of dependence is known as the theorem of Torricelli; the demonstration is too abstruse for introduction here, but the law itself is as follows: "*Particles of fluid, on issuing from an aperture, possess the same degree of velocity as if they had fallen freely, in vacuo, from a height equal to the distance of the surface of the fluid above the center of the aperture.*" The jet from C, for instance, has the same velocity as if the particles composing it had fallen in vacuo from the level of the liquid to C. Now, the velocity acquired by a body in falling is as the time of the fall; but the space fallen through being as the *square* of the time, it follows that the velocity acquired is as the square root of the space fallen through. In the first second, a body falls 16 ft., and acquires a velocity of 32 feet. If E, then, is 16 ft. below the level, a jet from E flows at the rate of 32 ft.; and if D is at a depth of 4 ft., the velocity of the jet at D will be half the velocity of that at E, or 16 feet. In general, to



find the velocity for any given height, multiply the height by 2×32, and extract the square root of the product. This rule may be expressed by the formula $v = \sqrt{2gh}$, in which v signifies the velocity of the issue, g the velocity given by gravity in a second, or 32 ft., and h the height of the water in the reservoir above the orifice. This last quantity is technically called the *head* or *charge*.

That this theory of the efflux of liquids is correct, may be proved by experiment. Let the vessel, MB, have an orifice situated as at *o;* the water ought to issue with the velocity that a body would acquire in falling from M to the level of *o*. Now, it is established in the doctrine of projectiles (q.v.), that when a body, is projected vertically upwards with a certain velocity, it ascends to the same height from which it would require to fall in order to acquire that velocity. If the theory, then, is correct, the jet ought to rise to the level of the water in the vessel at M. It is found in reality to fall short of this; but not more than can be accounted for by friction, the resistance of the air, and the water that rests on the top in endeavoring to descend. When the jet receives a very slight inclination, so that the returning water falls down by the side of the ascending, ten in. of head of water may be made to give a jet of nine inches. A stream of water spouting out horizontally, or in any oblique direction, obeys the laws of projectiles, and moves in a parabola; and the range of the jet for any given velocity and angle of direction may be calculated precisely as in projectiles. The range of horizontal jets is readily determined by practical geometry. On AB describe a semicircle; from D, the orifice of the jet, draw DF perpendicular to AB, and make BK equal to twice DF; then it can be proved by the laws of falling bodies and the properties of the circle, that the jet must meet BL in the point K. If BE is equal to AD, the perpendicular EH is equal to DF; and therefore a jet from E will have the same range as that from D. Of all the perpendiculars, CG, drawn from the middle point C, is the greatest; therefore, the jet from C has the longest possible range.

The area of the orifice and the velocity of the flow being known, it is easy to calculate the quantity of water discharged in a given time. Thus, suppose the area to be 1 sq.in., and the velocity 20 ft. a second, it is evident that there issues in a second a cylinder or a prism of water 1 sq.in. in section and 20 ft. long, the content of which is 1×240=240 cubic inches. In any given time, then, as three minutes (=180 seconds), the discharge is 240×180=43,200 cubic inches.

It has as yet been assumed that the water in the vessel or reservoir is kept constantly at the same height, and that thus the velocity is constant. We have now to consider the case of a vessel allowed to empty itself through an orifice at the bottom. As the surface of the water sinks, the velocity of the discharge diminishes or is retarded; and when the vessel is of the same area from top to bottom, it can be proved that the velocity is *uniformly* retarded. Its motion follows the same law as that of a body projected vertically upwards. Now, when a motion uniformly retarded comes to an end, the space described is just half what the body would have passed over had it gone on uniformly with the velocity it had at the outset. Therefore, when the vessel has emptied itself in the way supposed, the quantity discharged is half what would have been discharged had the velocity been uniform from the beginning.

The "Contraction of the Vein."—When, by means of the area of the opening and the velocity thus determined, we calculate the number of cubic feet or of gallons that *ought* to flow out in a given time, and then measure the quantity that actually does flow, we find that the actual flow falls short of the theoretical by at least a third. In fact, it is only the central part of the jet, which approaches the opening directly, that has the velocity above stated. The outer particles approach from all sides with less velocity; they jostle one another, as it were, and thus the flow is retarded. In consequence of this want of uniformity in velocity and direction among the component layers of the jet, as they enter the orifice, there takes place what is called a "contraction of the vein" (*vena contracta*); that is, the jet, after leaving the orifice, tapers, and becomes narrower. The greatest contraction is at a distance from the orifice equal to half its diameter; and there the section of the stream is about two-thirds the area of the opening. It is, in fact, the section of the contracted vein that is to be taken as the real area of the orifice, in calculating by the theory the quantity of water discharged. If the wall of the vessel has considerable thickness, and the orifice is made to widen gradually inwards, in the proportions of the contracted vein, the stream does not suffer contraction, and the area of the orifice where it is narrowest may be taken as the actual area of discharge.

Adjutages.—It has as yet been supposed that the issue is by means of a simple opening or hole in the side or bottom of the vessel; but if the flow takes place through a short tube, the rate of discharge is remarkably affected. Through a simple opening, in a thin plate, the actual discharge is only about 64 per cent of the theoretical; through a cylindrical conducting-tube, or *adjutage*, as it is called, of like diameter, and whose length is four times its diameter, the discharge is 84 per cent. The effect is still greater if the discharge-tube is made conical both ways, first contracting like the contracted vein, and then widening. The effect of a conducting-tube in increasing the discharge is accounted for by the adhesion of the water to its sides, which widens out the column to a greater area than it would naturally have. It has thus a tendency to form a vacuum in the tube, which acts like suction on the water in the reservoir, and

increases the quantity discharged. The flow is more free if the orifice is in the bottom of the vessel, than in the side on a level with the bottom. If the discharge-tube is made to project inwards beyond the thickness of the walls of the vessel, the velocity is much impeded, owing to the opposing currents produced by the water approaching the opening.

Pipes.—When a conduit pipe is of any considerable length, the water issues from it at a velocity less than that due to the head of water in the reservoir, owing to the resistance of friction. With a pipe, for instance, of 1½ in. in diameter, and 30 ft. long, the discharge is only one-half what it would be from a simple orifice of the same diameter. The rate of reduction depends upon the diameter of the tube, its length, the bendings it undergoes, etc. The resistance to the flow of water in pipes does not arise properly from friction, as understood of solids, but from the adhesion of the water to the sides of the pipe, and from the cohesion of the watery particles among themselves; it makes little difference, therefore, whether an earthenware pipe, for instance, be glazed or not. Large projections form an obstacle; but mere roughness of surface is filled up by an adhering film of water, which is as good as a glaze. The resistance increases greatly with the narrowness of the pipes. Engineers have formulas, deduced in great part from experiment, for calculating the discharge through pipes of given length and diameter, and with a given head; but the subject is too complicated for introduction here. If water flowed in a conduit pipe without friction or other obstruction, so that its velocity were always equal to that due to the head of water, there would be no lateral or bursting pressure on the walls of the pipe; and if the pipe were pierced, the water would not squirt out. Accordingly, with a short tube or adjutage, which, instead of obstructing, increases the flow, there is not only no lateral outward pressure on the walls of the tube, but there is actually a pressure inwards. If a hole is made in the wall of a cylindrical adjutage and the one end of a small bent tube is inserted in the hole, while its other end is dipped in a vessel of water, the water will be sucked up the tube, showing the tendency that the adjutage has to form a vacuum. But when the velocity of discharge is diminished by the friction of a long pipe, or by any narrowing, bending, or other obstruction in the pipe, then that portion of the pressure of the head of water that is not carried off in the discharge, becomes a bursting pressure on the walls of the pipe. This pressure is unequal at different parts of the pipe. At the end where the water issues free and unobstructed, it is next to nothing, and gradually increases towards the reservoir, where it is equal to the difference between the head of water in the cistern, and the head due to the velocity with which the water is actually flowing in the pipe. The principle now explained accounts for the fact, that pipes often burst or begin to leak on the motion of the water in them being checked or stopped.

Resistance of Water to Bodies moving through it.—This is greatly affected by the shape of the body, which ought to have all its surfaces oblique to the direction of the motion. When a cylinder terminates in front in a hemisphere, the resistance is only one-half what it is when the cylinder terminates in a plane surface at right angles to the axis; and if instead of a hemisphere, the termination is an equilateral cone, the resistance is only one-fourth. If a globe is cut in halves, and a cylinder, whose length and the diameter of whose base are each equal to the diameter of the globe, is fixed between them; this cylinder with hemispherical ends experiences less resistance than the globe alone, the diminution being about one-fifth of the resistance to the globe. Also the resistance increases in a higher ratio than the simple one of the velocity. One part of the resistance arises from the momentum that the body has to give to the water it displaces. Moving at a certain rate, it displaces a certain quantity; moving at twice that rate, it displaces twice the quantity in the same time. But not only does it displace twice the number of particles of water; it also has to displace them with twice the velocity; the pressure of the resistance is thus not merely doubled, but quadrupled or squared. Similarly, when the velocity is tripled, the resistance arising from the simple displacement of water becomes nine times as great. Another part of the resistance of liquids to bodies moving in them is owing to the cohesion of the particles, which have not to be thrown aside merely as separate grains, but to be torn asunder. In addition to this, when the velocity is considerable, the water becomes heaped up in front, and depressed at the other end from not having time to close in behind, thus causing an excess of hydrostatic pressure against the direction of the motion. Owing to the combination of these causes, the real law of the increase of resistance is difficult to investigate, and the results of experiments are not a little discordant. See WATER-POWER, WAVES.

HYDROFLUORIC ACID. See FLUORINE.

HYDROFLUOSILICIC ACID. See FLUORINE, *ante.*

HYDROGEN (symbol H, equiv. 1), so called from the Greek words *hydōr*, water, and *gennāo*, to generate, is an elementary substance, which exists as a colorless and inodorous gas (regarded as permanent till 1878). One of its most striking peculiarities is its specific gravity, it being the lightest of all known bodies. Assuming the weight of a given volume of atmospheric air to be 1, the weight of the same volume of hydrogen under similar conditions is 0.0692; hence hydrogen is 14½ times lighter than atmo-

spheric air; while, on the other hand, it is 241.573 times lighter than platinum, the heaviest body known. Its refractive power is greater than that of any other gas, and is more than 6 times as great as that of atmospheric air. It is combustible; that is to say, it is capable of combining with oxygen, and developing light and heat. When a lighted taper is passed up into an inverted jar of hydrogen, the gas burns quietly with a pale-blue, scarcely visible flame, and the taper is extinguished. The flame only occurs at the line of junction of the hydrogen and the external air. If the hydrogen be mixed with air or oxygen prior to the application of the taper, the whole mixture is simultaneously inflamed, and there is a loud explosion, which is most violent when 2 volumes of hydrogen are mixed with 1 volume of oxygen, or with 5 volumes of atmospheric air. The hydrogen and oxygen in these cases combine to form watery vapor or steam, which suddenly expands from the high temperature attendant on the combustion, but immediately afterwards becomes condensed; this condensation causes a partial vacuum, into which the surrounding air rushes, and by the collision of its particles produces the report. At ordinary temperatures, water dissolves rather less than 2 per cent of its volume of hydrogen. Hydrogen was liquefied for the first time in 1878, and even solidified (see GASES). Pure hydrogen, though it cannot support life, is not poisonous, and when mixed with a sufficient quantity of atmospheric air or oxygen, may be breathed for some time without inconvenience.

Hydrogen does not possess very marked chemical properties. The only substances with which it combines directly at ordinary temperatures are chlorine and oxygen. Hydrogen and chlorine, mixed together, and exposed to direct sunlight, combine with explosion; in diffused daylight, they gradually unite; but in the dark do not act on one another. Hydrogen and oxygen do not combine spontaneously even in direct sunlight, but require the presence of a red-hot solid, of flame, or of spongy platinum.

It is generally stated that hydrogen does not exist naturally in a pure or uncombined state, but Bunsen recognized its presence in variable proportions in the gases evolved from the solfataras of Iceland, and it will probably be detected in other localities where similar geological relations hold good. In combination with oxygen, as water, it not only forms a very considerable part of the earth, and of the atmosphere, but enters largely into the structure of every animal and vegetable organism. It is an essential ingredient of many inflammable minerals, such as coal, amber, and petroleum; and of certain gases, such as marsh gas, ammonia, and hydrosulphuric acid (or sulphureted hydrogen). It likewise enters into the composition of a large number of manufactured substances and products used in the arts, medicine, etc., as for instance, sal-ammoniac, starch, sugar, vinegar, alcohol, olefiant gas, aniline, indigo, morphia, strychnia, hydrocyanic acid, etc.

There are numerous ways in which hydrogen may be prepared, but the usual and most convenient process is by the action of diluted sulphuric acid on zinc. About half an ounce of granulated zinc is placed in a retort, and a dilute acid, prepared by gradually mixing an ounce of oil of vitriol with six ounces of cold water, is poured on the zinc. Hydrogen gas is rapidly evolved in great abundance, but the first portions should not be collected, since they are mixed with the atmospheric air which was contained in the retort. The rest of the gas may be collected in the ordinary way over water. In this process the zinc takes oxygen from the water, and forms oxide of zinc, which combines with the sulphuric acid, forming sulphate of zinc, which remains in solution, while the hydrogen of the decomposed water escapes. The reaction is shown in the formula, $Zn + HO,SO_3 = ZnO,SO_3 + H$. A precisely similar reaction ensues if we use iron in place of zinc, but in this case the gas is generally less pure.

Hydrogen gas, under the name of combustible air, was obtained in the 16th c. by Paracelsus by treating certain metals with dilute acids, and was more or less known to Boyle and others; but Cavendish, in his paper on "Factitious Airs," published in the *Transactions of the Royal Society* for 1766, was the first to describe accurately the properties of this gas, and the methods of obtaining it; hence he is usually mentioned as its discoverer.

HYDROGEN, BINOXIDE OF (symb. HO_2, equiv. 17), is a colorless liquid of a syrupy consistence, with a specific gravity of 1.45 (water being 1), and a peculiar odor, something like that of very dilute chlorine. It bleaches vegetable colors, and when applied to the tongue or the skin produces a white spot, and excites considerable pain. From the readiness with which it gives off its oxygen, it is a powerful oxidizing agent. The method of preparing it is complicated and difficult. This substance was discovered in 1818 by Thenard, who termed it oxidized water. Dr. B. W. Richardson, an eminent London physician, has lately examined its value (in solution) as a therapeutic agent, and has found it to be of extreme use in whooping-cough, in certain forms of rheumatism, and (as a palliative) in the last stages of consumption.

HYDROG'RAPHY (Gr. *hydōr*, water, *graph-*, to write) is a description of the surface waters of the earth, particularly of the bearings of coasts, of currents, soundings, islands, shoals, etc., and of anything the knowledge of which may be useful for purposes of navigation. It consequently includes the construction of charts, maps, etc., in which these particulars are detailed. It is, in fact, to the sea what geography is to the land. The first step in the erection of hydrography into a science was made in the

15th c. by Henry the navigator, who was the first to construct a sea-chart worthy of the name. Among the maritime nations of Europe it is now made a matter of prime concern; the hydrographic office being an important branch of the naval administration. The head of the hydrographic department in the British service is usually a capt. in the royal navy. The officers surveying in different parts of the world send their observations, soundings, etc.; and it is the business of the hydrographer to consolidate these into available maps. The hydrographer receives £800 a year in addition to his half-pay. In proof of the value attached to these admiralty charts among the marine of England and even of foreign nations, it may be mentioned that many thousand charts, besides books of sailing directions, are sold annually.

HYDROG'RAPHY (*ante*). The science of hydrography received a new impulse from the celebrated capt. James Cook, of the English navy, who introduced what is known as running surveying, but his system has been greatly improved. The commencement of Cook's hydrographic surveys was in 1759, when he was master of the frigate *Mercury*, stationed at Quebec with the squadron co-operating with gen. Wolfe. He commenced a series of observations of the St. Lawrence river, which were continued until he was able to publish a chart of the river from Quebec to the Atlantic ocean. In 1763 he was sent out to survey the coast of Newfoundland, and in 1764 he received the appointment of surveyor of the coast of Newfoundland and Labrador. Wherever he was ordered he continued his hydrographic observations until the year of his death, 1779. The French had been observers of his operations, and in 1785 La Perouse was sent with two ships and a corps of scientists to visit the n.w. coast of America and to explore other parts. He made important observations there, and also on the n.e. coast of Asia. After spending two years and a half he went to Botany Bay, after which he was never heard from, except that information was obtained seven or eight years afterwards which made it probable that the ships were wrecked on a coral reef on the coast of Mallicollo. But La Perouse had sent duplicates of charts and journals up to the time of his arrival at Botany Bay. The navigating officer of the expedition, Beautemps-Beaupre, sent out to search for La Perouse in 1791 under the command of D'Entrecasteaux, wrote a work on marine surveying, which was published in an appendix to the narrative of the voyage (1808). This, however, had been preceded by Alexander Dalrymple's essay on marine surveying, published in 1771. Beautemps-Beaupre was placed in charge of the survey of the French coast, where he trained a number of hydrographers, the commencemant of a corps of engineers for future exploration and surveying. Most civilized nations now have their governmental hydrographic offices, and numbers of officers and men are engaged in making surveys, but England leads all other nations in this direction, having made accurate surveys of her domestic and foreign coasts, and many of those of other nations. The most important, perhaps, of all the expeditions ever sent out by Great Britain was that of the *Challenger*, which sailed from Sheerness on Dec. 7, 1872, and returned to Spithead on May 24, 1876, having during this time traversed a distance of more than four times the equatorial circumference of the earth, and established 362 observing stations along the course traversed. The objects, however, of this expedition extended, in many respects, beyond the observation of the configuration of the floor of the ocean or of its coast line; had regard to many botanical, zoological, and geological questions. During the first year the Atlantic was crossed six times, and a diversion made from Bermuda to Halifax and back again to make observations upon the gulf stream. The ship then went to the cape of Good Hope, and from thence southward toward the Antarctic ice barrier, and after taking observations along its margin proceeded to Melbourne, Sidney, and New Zealand. Then the western part of the great area of the Pacific was examined and the adjacent part of the Malay archipelago. On leaving this for Japan, at a point n. of New Guinea, the deepest sounding of the expedition was made, and the deepest reliable sounding, it is claimed, that has yet been made, viz., 4,475 fathoms, or more than five miles. From Japan she steered due e. as far as the meridian of the Sandwich islands; thence to that group; thence to Otaheite, as far beyond the equator; from Otaheite to cape Horn; thence to Valparaiso and back through the straits of Magellan, to the Falkland islands, to Montevideo, and thence eastward half-way across the Atlantic to complete some work partly done during the first year; thence due n. in the meridian of Madeira as far as the equator; thence n.w. at some distance from the coast of Africa, following the middle line of the north Atlantic, past the Azores, and thence home. At each of the observing stations a sounding was taken to determine the exact depth; the bottom temperature was ascertained, and a sample of bottom water obtained. Some of the bottom, from an ounce to a pound, was also brought up, and at most of the stations the temperature of the water at several different depths was taken, and also a fair sample of the bottom fauna obtained by the dredge. The direction and rate of the surface water was determined, and at times attempts were made to determine the direction and velocity of the water at different depths. In addition to this, meteorological and magnetic observations were regularly taken and recorded. The work accomplished included, among many other results, the determination of the depth and configuration of the ocean basins. But little was previously known of this except what had been obtained in surveying lines for telegraph cables. Facts had been observed during these cable-line surveys which were supposed to

be exceptional, but the soundings of the *Challenger*, and those of the U. S. ship *Tuscarora* and the German *Gazelle*, have shown them to be general. See SEA SOUNDING, DEEP SEA, *ante*. The methods practiced in hydrography vary with circumstances. When the advantages of good triangulation exist, a hydrographic chart can be constructed with great accuracy. The principles involved are the same as those in geodetic surveying or leveling, the vertical measurements being taken with a sounding line instead of a rod, and the element of time employed to approximate horizontal distances. A boat is started at a certain point which has been determined by triangulation, and takes a course towards another point whose position is also known. The boat is then propelled with as near a uniform rate of motion as possible, and soundings are taken in succession at regular intervals during the transit, and recorded. The plotting of this line will, of course, give the depths of water all along its course at the time it was taken. A tide gauge, which gives the state of the tide at the time, will also determine the depths of the soundings at mean low water. A number of "sounding lines," as these courses are called, having been run across the bay or harbor, or whatever sheet of water is being surveyed, and of such a number as may be thought necessary, which will depend upon the nature of the bottom, the data are obtained for the plotting of a chart. If the bottom is known to be comparatively even, and no rocks or steep slopes have been found, and if it be convenient to do so, the lines may all be run in parallel directions. But when the bottom is quite uneven, and there are rocks or sunken vessels, these parallel lines should be crossed, as nearly at right angles as possible, by another series of parallel lines, and all should be as close together as practicable. When the shore cannot be used for triangulation a base line must be established, as well as circumstances will allow, by anchored boats whose distance apart may be computed by the time which sound is found to travel from one to the other; or, if the water be not too rough, by the average time it takes to row in both directions from one boat to the other; or a cord may be used to measure a distance too great. Sounding lines may then be run in different directions from these points of observation, between points which can be established, or in directions towards prominent objects on shore, and the distance traversed estimated by such means as may be most convenient, according to the resources of the engineer. It is often necessary, especially when it is impossible to run the sounding boat with uniform motion, or where the bottom is quite uneven, or the position of rocks is to be determined, to take two observations on shore with theodolites simultaneously with any special soundings, the time being determined by a ball or flag signal, or a flash made from the boat. The angles being taken between the point designated by the signal and another established point, its locality is readily established. The hydrography of the United States is in charge of the coast survey. There is a coast survey office and a hydrographic office, the latter established in 1866. See COAST SURVEY, GEODESY, and TRIANGULATION.

HY'DROIDS, marine animals which have been variously classified by naturalists because of the extreme difficulty of studying their natural history. Modern classification makes them a sub-class, Hydroida, in the class Hydrozoa, sub-kingdom Cœlenterata, the representative of Cuvier's Radiata. The Hydroida possess a great deal of interest because remaining so long unrecognized in some of their phases of life. In one stage of their existence they so much resemble sea plants that for a long time they escaped recognition. Patient labor, however, has at last placed them in their proper relations. These hydroids exist in compound colonies of alternate generations, one kind having the office of feeding the community, the other of reproduction. The feeding hydroids are usually fixed, or attached to some object, and proceed from eggs of the reproductive, or medusæ hydroids, the latter in turn growing from buds produced by the former. The medusæ hydroids sometimes remain attached to the stem, or become free-swimming medusæ. The body of the nutritive hydroid is usually supported by a stem of variable length, but may rest immediately upon the bottom. From one individual buds appear and produce branching colonies of hundreds or thousands, often having a height of 15 or 20 inches. The reproductive hydroids are sometimes developed into perfect medusæ before leaving the parent stem, but they usually break away before attaining their perfect state. Some buds never become much developed, and are called sporosacs. These usually remain attached, but attain sexuality and reproductive power. The free-swimming medusæ often grow 9 or 10 in. in diameter, but many of them, it is said, remain very small, seldom attaining a diameter of more than an inch. See ACALEPHÆ; GENERATIONS, ALTERNATION OF; ZOÖLOGY, *ante*.

HY'DROMANCY. See DIVINATION.

HYDROMA'NIA. See PELLAGRA and SUICIDE.

HYDROM'ETER. See AREOMETER.

HY'DROMYS, a genus of rodent quadrupeds, of the family *muridæ*, of which there are only two known species, very similar to one another, natives of Tasmania. They have two incisors and four molars in each jaw. They are called beaver rats in Tasmania; are nocturnal and very shy; inhabit the banks of both fresh and salt water, and swim well. The largest species is twice the size of a common rat. One of them has the belly white, the other yellow.

HYDROP'ATHY, or HYGIEN'IC MEDICINE, popularly termed the water cure. Under the head of baths and bathing (q.v.), an account has been given of the bath in general, as a means of preserving health. We have here to speak of water in its manifold uses as an engine in the cure of disease, and as forming a principal element in that combination of hygienic appliances which goes to make up hydropathy as at present practiced. (In accordance with the plan followed in other cases of the kind, the view exhibited is that of an adherent of the system.)

The efficacy of water, in the cure of numerous forms of disease, has long been recognized. Water was largely employed by Hippocrates, the "father of medicine," more than 2,300 years ago, in the treatment of many kinds of disease; and along with a regulated diet, and an implicit belief in the *vis medicatrix naturæ*, it appears to have formed the chief element in his medical armory. Horace has enshrined the memory of Antonius Musa, the hydropathic physician of the emperor Augustus (Epist. i. 15). Both Celsus and Galen—who flourished, the one about 50 years B.C., and the other in the 2d c.—speak favorably in their writings of the use of water in the cure of disease, regarding it as of high value in the treatment of acute complaints, particularly of fevers. Throughout the middle ages, likewise, many physicians of name, including Aetius and Paulus Ægineta, and the more celebrated Paracelsus, were advocates of the remedial virtues of water; all of them, however, having faith in its uses in the treatment rather of acute than of chronic disorders. In 1723 Nicolo Lanzani, a Neapolitan physician, published a learned treatise on the subject. In our own country, about the beginning of the 18th c., sir John Floyer and Dr. Baynard made a large use of water. Their conjoint work, denominated *Psychrolousia*, or the "History of Cold Bathing, both Ancient and Modern," is replete with quaint learning and practical shrewdness and sagacity. But the most able and scientific among the older treatises that have appeared in England on the subject of the water treatment, is the work of the well-known Dr. Currie (q.v.), the biographer of the poet Burns, published in 1797, and entitled *Medical Reports on the Effects of Water, Cold and Warm, etc.* In this work, Dr. Currie recommends the cold affusion in typhus and other fevers, and gives practical directions in regard to the cases and the times when it may be used with advantage. Eminent physicians of the present day have admitted that these views, so far as they went, were as scientific in principle as they were novel in their application; but the practice founded on them was considered too dangerous by Currie's contemporaries, and fell into speedy neglect. It is worthy of remark that Currie appears to have limited his use of water to acute ailments exclusively.

We have thus seen that up to the beginning of the present century, by some of those who employed it as a curative agent, water was used in the treatment of acute, and by others of chronic diseases; by some as an internal agent alone, by others as an external application in the various forms of the bath, but never in all the manners combined. This combination was first effected by the original genius of Vincent Priessnitz, a Silesian farmer, with whom began a new era for the water-cure. It was owing, we are told, to his successful treatment of more than one bodily injury which he had sustained in his own person that, about the year 1820, Priessnitz became so fortified in his convictions as to the curative powers of water as to devote himself to employ it medically in the cure of others. Beginning with the external application of water for trifling diseases among the poor of his neighborhood, he gradually undertook an extended range of cases, and multiplied the modes of administration, introducing the wet compress, the douche bath, partial baths of all kinds, the sweating process, the wet sheet, together with copious drinking of pure water. In addition to water in all these forms, he insisted on the value of exercise, diet, fresh air, and mental repose, in the cure of disease; thus practically calling to his aid the entire resources of hygiene, and establishing by a simple, yet thoroughly original combination, nothing less than a new system of medical treatment. As to the success which attended Priessnitz's practice, it is a historical fact that of 7,500 patients, who had gone to Gräfenberg for advice and treatment, up to the year 1841, or within the space of about 20 years, there had been only 39 deaths, and some of these, according to the registry of the Austrian police, "had died before commencing the treatment, while some others were reported in a forlorn state before anything was attempted." It is to be regretted, however, that the founder of the new system was not himself an educated physician, so that he could have understood better the philosophy of his own practice, and explained it more correctly. He would not have called his system the "water-cure," a name scientifically one-sided and incomplete, and therefore misleading. It is equally to be regretted that many of the immediate followers of Priessnitz, while destitute of his remarkable sagacity and genius, should have been no better furnished than himself with a scientific knowledge of disease and general professional culture.

In spite of all drawbacks, however, the undoubted merits of hydropathy at length called to its defense many men of standing in the profession, who, allowing for some of its early extravagances, stepped forth to explain it scientifically, and pressed it on the acceptance of their brethren; and from their advocacy has sprung up in England a school of hydropathic physicians, the philosophy of whose plan of treatment we shall now briefly describe.

Physiology teaches us that the various organs of our bodies cannot be kept in a

healthy state without the observance of certain regulations called the primary "laws of health." When these are broken, the result to the offender is disease in one of its many forms. Until the appearance of hydropathy, physicians attempted to correct the evil thus caused—and the great majority do so still—by the administration of one or other of the drugs which go to form the medical repertory known as the pharmacopœia; and the argument on which this practice has been based is the very simple one, that experience has proved the medicine or medicines to be efficacious in a large proportion of similar cases. Hydropathy proceeds according to a very different method. Taking as his central maxim the principle first propounded by Hippocrates, that it is nature's own strivings after health (*vis medicatrix naturæ*) that really cure the patient when he is cured, the function of art being mainly to remove obstacles, the hydropathic physician avoids using all means with whose effects he is not thoroughly conversant, or which may, at least, interfere with nature's own operations. Hence, as a rule, he eschews the use of drugs, and betakes himself to those more simple natural agents which, in their totality, receive the name of hygiene. The conditions of health, as unfolded by physiology, may be briefly stated to consist of five necessary requirements—air, exercise, water, diet, and nervous repose. These are undeniably essential to the preservation of health; no human being can possibly continue in a fair state of health when deprived of the just proportion of any one of them. This proposition, which may be regarded as axiomatic, forms the starting-point of hydropathy in the cure of disease. Admitted that certain agencies are necessary to the preservation of health, the hydropathic principle is simply this, that the very same agencies, infinitely modified of course according to the requirements of each particular case, and generally much intensified, are not only the safest, but by far the surest means of curing chronic disease; or, to put it more correctly, are the best means which can be brought to nature's assistance for enabling her to effect a cure herself.

Here it is proper to explain what is meant by saying that the natural agents of health are *intensified* when they are used, not for the preservation of health, but the cure of disease; or, in other words, when we pass from natural hygienics to natural therapeutics. Take the element of exercise, for instance, one of the most powerful hydropathic agencies. Every one knows, although but few act systematically on the knowledge, that a certain amount of exercise is necessary to maintain the body in health; the hydropathic doctrine, accordingly, is, that in the cure of chronic disease, this exercise must be intensified—increased to the full extent which the patient's strength will warrant. So, again, as to the use of water: a certain amount of pure water, used externally and internally, is also necessary to the maintenance of health; hydropathically, a much more liberal use of the same element in both ways is necessary to the cure of disease. The reader's special attention is called to this, which in fact is the very kernel of the hydropathic theory.

Let us now explain more in detail how and in what cases hydropathy employs the agents on which it relies. Diseases may, for general purposes, be divided into two great classes: those in which the physician is called on to lower or *reduce* to the standard of health; and those in which the object of his endeavors is, on the other hand, to assist in *elevating* to the same standard. In the former category, range themselves all those diseases which are marked by a plethoric or inflammatory type—by an overplus of maldirected strength in the economy; in the latter, those distinguished by a corresponding diminution in the vital powers. It may be truly affirmed, that to rectify both these abnormalities, and to restore the equilibrium of health, is the great object of medical treatment. The ordinary practice seeks to achieve this object mainly, in both instances, by means of drugs, respectively adapted to the two classes, and tending to lower in the one case and to exalt in the other. The hydropathic practice, with the same object in view, employs, as already stated, the natural remedies—air, exercise, water, diet, and repose.

Thus, in dealing with acute and plethoric complaints, and the whole order of diseases ranging themselves under the former of the divisions just indicated, water is the element which enacts by far the most conspicuous part, and the application of it most serviceable in these cases is the *wet sheet* or *pack*. Indeed, the discovery by Priessnitz of this application of water was perhaps the most important contribution which he made to the new system of which he was the practical founder, inasmuch as it at once supplied one of the most powerful and at the same time one of the safest methods of combating almost every form of acute disease. This, the most distinctive of hydropathic appliances, may be thus described: Over the mattress of a bed or sofa is extended a stout blanket, and on this is spread a linen sheet, well wrung out of cold water, so that it is only damp. On this the patient is laid, and immediately enveloped tightly with a heavy weight of blankets upon him, tucked in so closely as to completely exclude all air. The body's natural heat, acting on the damp linen, generates vapor almost immediately, and the patient forthwith finds himself, not in a cold, but in a comfortably warm vapor bath—in a novel, but by no means unpleasant form of body poultice. The effects of this process on the economy seem to be plain enough. It is clear, in the first place, that the pores of the skin, so numerous and performing so important a function, must thereby be thoroughly cleansed, and the blood itself depurated; with the equalization of temperature over the entire surface of the body, will follow a cor-

responding equalization in the distribution of blood throughout the system, thereby relieving internal congestions wherever occurring; and lastly, from the soothing effects on the nervous system, and the allaying of all irritation, must result not only the alleviation of pain, but that lowering of the heart's action, and with it of the circulation of the blood, of such incalculable importance in the treatment of many forms of disease, and especially of fevers. Such is the wet sheet.

Of the same order of remedy, although in many respects very different from it, is the Turkish bath, recently introduced into England, and now fairly established throughout the country. In this bath, the hydropathic procedure has received a most important auxiliary in the treatment of many forms of disease, but in an especial manner of the kind more particularly under consideration at present, such as gout, rheumatism, bronchitis, and other complaints of an inflammatory or febrile character. The same end of diaphoresis, or sweating, is secured, although not so efficiently, by means of the vapor bath as used by the Russians, and by hot air as generated by the spirit-lamp. The latter has the advantage of being less expensive, and the bather not being required to breathe the heated air, many persons can use it who would be quite unable to respire, without faintness, the highly heated atmosphere of the Turkish bath. In addition to the above, must be mentioned the use of warm fomentations, in the form of flannels wrung out of boiling-water—a kind of application much relied on for subduing local pain proceeding from whatever cause, for relieving congestion, and abating and checking inflammation. So much for the principal hydropathic operations employed to treat acute and inflammatory diseases—processes corresponding in their aims and effects to antiphlogistic, diaphoretic, and sedative drugs.

We have now to speak of the hydropathic agents brought to bear on the second great division of maladies, wherein the object is not to lower, but to elevate, to the standard of health. In the former class of cases, it was stated that water was the agent most prominently brought forward, and it is in such diseases alone that the term "water cure" is at all appropriate. In those we are at present dealing with, water certainly plays an important part, but it is only in its combination with good air, exercise, regulated diet, and nervous repose, that diseases are cured as they are. As an illustration: A cold bath is given in the usual way as a tonic. Its effects are admirable under certain conditions—the first and chief of these being that a good reaction takes place; that the blood, which had been driven by the constringent effects of the cold water from the surface of the body into the inner parts, should return in increased force when the stimulus of cold is withdrawn. But to this end, in all but very strong persons, exercise immediately after the bath is indispensably necessary, and must follow it as a matter of course, or the bath cannot be administered with comfort, or even with safety. As much might be said for the co-operative importance of pure air, of diet, and of nervous repose, all of them, if necessary to the preservation of health, of tenfold importance in the cure of disease. Thus the highly tonic properties of the bath, administered in its various forms, and followed by a due proportion of exercise, more especially in strong bracing air, produce at once a marvelous effect in sharpening the appetite and improving the powers of digestion, so that, if simple and nourishing diet is administered, better blood will be elaborated, and, consequently, every tissue of the body be more highly nourished and invigorated. It is scarcely necessary to say, that, in all cases, this is and must always be a gradual process, for it is evident that the treatment pursued, whether in reference to exercise, diet, or the use of the stimulus of water, must bear an accurate relation to the invalid's strength. Little by little, however, and in most cases much more rapidly than might be imagined, improvement begins to take place. From the great action brought to bear on the skin by means of the different applications of water, the prudent use of the Turkish bath, and the effects of full exercise, a rapid change of the particles of the body takes place—so rapid, that, according to Liebig, "by means of the water-cure treatment, a change of matter is effected in a greater degree in six weeks, than would happen in the ordinary course of nature in three years"—while, at the same time, the effete matter thrown off is replaced by the healthier materials supplied to the economy by an improved quality of blood, itself the result of an improved digestion, and this, again, resulting from the heightened *vis vitæ* which the combined hydropathic agencies have produced. The forms of the bath may of course be varied *ad infinitum*, as well as its power according to the temperature of the water. The baths most in vogue in daily practice are technically denominated the *wash down*, *dripping sheet*, *shallow*, *sitz bath*, and *douche*, together with the *pack*, or *wet sheet* before mentioned; in addition to which there is a catalogue of local applications, too extensive to enumerate. These various appliances of water are capable of producing extraordinary effects on the economy, constituting, as they do, especially when conjoined with exercise, the most powerful tonics, and, at the same time, the most safe and agreeable, that can be brought to bear on the body. It might truly be added that, in the treatment of chronic disease, this same element, water, is capable of becoming, according to the manner and quantity of its use, internally and externally, an alterative, derivative, diuretic, and diaphoretic. It is as a tonic and stimulant, however, that its virtues are most conspicuous, and most called into requisition for the cure of chronic ailments.

From a variety of circumstances, the system of hydropathic medicine has been

greatly misunderstood and misjudged by the general public. For one thing, the name of "water cure," or "hydropathy," adopted by Priessnitz, has been very prejudicial, as leading to the false inference that the one element of water alone constitutes the bone and marrow of the system, playing the part of a panacea for every form of human ailment. Such a notion has never been maintained by the practitioners of scientific hydropathy, and it is matter of regret that some more comprehensive and catholic title, as that of "hygienic medicine," has not long since been adopted. As it is, the prejudice against the system is gradually giving way; it is no longer treated as heresy by the orthodox profession; and many enlightened practitioners are in the habit of sending certain classes of their patients to hydropathic establishments, and even subject themselves to the treatment. In fact, the tendency of ordinary medical practice has of late years been towards the principles on which hydropathy is based. A manifest disposition exists on the part of the more enlightened members of the profession to rely much less on art and much more on nature in the treatment of diseases of every type, but especially those of a chronic character, than was formerly the case; and as the practitioners of scientific hydropathy by no means exclude the use of drugs, when they appear to be necessary, it would seem that a convergence of opinion is really coming about.

Hydropathy, hitherto, has been almost exclusively practiced in large establishments, presided over by competent medical men, and dedicated to a thorough and systematic carrying out of the principles on which the system of cure is founded. There can be no question that this is by far the most complete and satisfactory arrangement when it can be accomplished. But the power of leaving their daily work for the purpose of seeking health, is what falls to the lot of very few; and if the hydropathic treatment were to be absolutely limited to its chosen retreats in the country, and incompatible with the business and work of town-life, it would be shorn of half its utility as a remedy, and be a luxury to which only the rich and disengaged could aspire. But exercise, morning and evening, can usually be had by most persons. The same applies to the systematic and persistent use of the bath, to the regulation of diet, and the observance of early hours. By these means, even without country air and other hygienic adjuncts, no doubt a vast deal might be done both for the cure of disease and the preservation of health. Towards effecting the latter object, at least, no one will deny the immense value of hydropathy. No one, having any practical acquaintance with it, can doubt its influence in the promotion of those habits of temperance, cleanliness, self-denial, and general obedience to the laws of health, which, while they tend so much to the happiness of the individual, go no less to secure the strength and prosperity of nations. To those who would inquire further into the subject, we may recommend the work of Dr. Gully, entitled *The Water-cure in Chronic Disease;* that of Dr. James Wilson, called *Principles and Practice of the Water-cure;* the several works of Dr. Edward Johnson; and Dr. Lane's treatise, *Hydropathy, or Hygienic Medicine.*

HYDROPH'IDÆ, a group of venomous water snakes, of which more than fifty species are known, chiefly inhabitants of the coasts of eastern seas, from India to Australia and New Zealand. In their form and movements they have a strong resemblance to eels. They have a compressed tail, and are rapid and graceful swimmers, frequenting the mouths of rivers, but are said to be incapable of living out of salt water, although nearly related to the hooded snake or *cobra da capello* of India (q.v.). They are exceedingly venomous and are much dreaded by the fishermen, whose nets often gather them. The order OPHIDIA, to which they belong, are not all as well classified as is desirable. See SERPENTS.

HYDROPHI'LIDÆ, a family of coleopterous insects, called water beetles. They are great swimmers, many of the species having oar-shaped legs. Their larvæ are carnivorous, but the fully developed insect feeds on decayed vegetable matter. Some members of the family inhabit salt water. See COLEOPTERA.

HYDROPHO'BIA (derived from *hydōr*, water, and *phŏbos*, fear) is one of the diseases that are produced by animal poisons. A person is bitten by a mad dog or other animal. The wound gradually heals in the ordinary manner. After an uncertain interval, usually ranging from six weeks to eighteen months, which is termed the period of *incubation*, the following symptoms appear: The patient experiences discomfort or pain at the seat of the bite. The cicatrix tingles or feels stiff or numb; sometimes becomes swelled and livid, and occasionally reopens, and discharges a peculiar ichor. The morbid sensations gradually extend from the original seat of injury towards the trunk. This period is termed the stage of *recrudescence*. Within a few hours, or, at longest, a very few days after the exhibition of this local irritation, during which time the patient has a sense of general discomfort and illness, the specific constitutional symptoms begin to manifest themselves; he complains of pain and stiffness about the neck and throat, finds himself unable to swallow fluids, and every attempt to do so—often even the sight or the sound of fluids—brings on a terrible paroxysm of choking and sobbing; and this continues for two or three days, till the patient dies from pure exhaustion. The passage of a gust of wind across the face, or the waving of a mirror before the eyes, is often sufficient to excite these paroxysms. The mental condition in the last stage of this disease varies; the patient may be calm and tranquil; generally he

is irritable and apprehensive, and suspicious; and in most cases, a certain degree of delirium, or even mania, is associated with the irritability. Death most commonly takes place on the second or third day after the commencement of the specific symptoms.

Some medical writers have maintained that hydrophobia may occasionally be spontaneously developed in man, as is undoubtedly the case occasionally in the lower animals (the dog and wolf, for example); but even if this ever occurs, the instances are so extremely rare as not to affect the general statement, that in man the disease is the result of an animal poison, which is most commonly communicated by the bite of the dog, but which has also been produced by the bite of the wolf, the jackal, the raccoon, and the cat. The poisonous saliva is perfectly innocuous when applied to the unbroken skin; to produce its effects, there must be some abrasion of the cuticle; but according to the late Mr. Youatt, it may enter the system by mere contact with mucous membranes.

The disease is said to have been caused by the mere *scratch* of a cat; but as both cats and dogs frequently apply their paws to their mouths, the poisonous saliva may be introduced in this way by the claws.

There has been much discussion as to what becomes of the poison. Is it immediately taken into the system generally, or does it remain imprisoned in the wound or cicatrix for a time? In the latter case, we might successfully remove the poison any time between the infliction of the bite and the period of recrudescence; and that the poison is thus locally retained seems more than probable from the fact that at this period morbid phenomena of various kinds exhibit themselves at the seat of the wound, and that these phenomena are speedily followed by the characteristic symptoms of the disease.

Little need be said of the treatment of hydrophobia, for there is no well-authenticated case of recovery on record. The most distressing symptoms may, however, be alleviated by chloroform, opiates, the hot-air bath, etc. But although the disease cannot be cured, its development may be prevented by the early and complete excision of the bitten part, provided the situation of the bite allows of the free use of the knife. "If," says Dr. Watson, "the injury be so deep or extensive, or so situated that you cannot remove the whole surface of the wound, cut away what you can; then wash the wound thoroughly and for some hours together, by means of a stream of warm water, which may be poured from a tea-kettle; place an exhausted cupping-glass from time to time over the exposed wound; and finally apply to every point of it a pencil of lunar caustic. If you cannot bring the solid caustic into contact with every part, you had better make use of some liquid escharotic; strong nitric acid, for example." Early excision is the only sure preventive, but if, for any reason, the operation has been omitted in the first instance, it is advisable, for the reasons already given regarding the probable latency of the poison, to cut out the wound at any period before symptoms of recrudescence appear. The reason why many neglect to have immediate recourse to excision probably is, that hydrophobia by no means follows, as a matter of certainty, the bite of a rabid animal. John Hunter states that he knew an instance in which, of twenty-one persons bitten by a mad dog, one alone was infected. On the other hand, we have evidence that of one hundred and fourteen persons who were bitten by rabid wolves, sixty-seven, or more than one half, were victims to this disease. Although we have no very trustworthy evidence on a large scale, there is no doubt that the majority of persons who are bitten by a mad dog do escape the disease, even without taking any precaution. In many of these cases, the virus is probably removed by the teeth passing through the clothes.

The nature of the disease in the dog or other animal whose bite causes hydrophobia, is considered under RABIES.

HYDROPHYLLA'CEÆ, a natural order of exogenous plants, containing about 80 known species, natives chiefly of the colder parts of America. None of them are of importance for any use to which they are applied, although *hydrophyllum canadense* has been reputed in North America a remedy for snake bites, and the leaves of *H. virginicum*, or Shawanese salad, are eaten by the Indians, both raw and boiled; but some of them are favorite ornaments of our flower-borders, particularly different species of *nemophila*. The order includes some small trees and bushes as well as herbaceous plants. They are often hispid, like the *boraginaceæ*.

HYDROSTAT'ICS treats of the equilibrium of liquids, and of their pressures on the walls of vessels containing them; the science depends on the way in which the molecules of a liquid form a mass under the action of gravity and molecular attraction, the latter of which is so modified in liquids as to give them their state of liquidity. While the particles of a liquid cohere, they are free to slide upon one another without the least apparent friction; and it is this perfect *mobility* that gives them the mechanical properties considered in hydrostatics.

The fundamental property may be thus stated: WHEN A PRESSURE IS EXERTED ON ANY PART OF THE SURFACE OF A LIQUID, THAT PRESSURE IS TRANSMITTED UNDIMINISHED TO ALL PARTS OF THE MASS, AND IN ALL DIRECTIONS. Most of the other propositions of hydrostatics are only different forms or direct consequences of this truth. This is a physical axiom, but its truth may be experimentally proved. Suppose a close

box B filled with water, and having a tube *a* inserted into the upper cover, of an inch in area, and with a plug or piston fitting into it. If the piston *a* is now pressed down upon the water with a force equal to a pound-weight, the water, being unable to escape, will react upon the piston with the same force; but it obviously will not press more against *a* than against any other part of the box, therefore every square inch of the interior surface of the box is pressed outward with the force of a pound. If, then, there is another tube inserted in any part of the box with a plug of the same area, as at *b*, it will require a force of a pound to keep this plug in its place. (We leave out of account at present the pressure upon *b* arising from the *weight* of the water in the box above it, and consider only the pressure propagated by the forcing down of the plug *a*.) However many plugs of the same size there were, each would be pressed out with the same force of a pound; and if there were a large plug of four times the area, as at *c*, it would be pressed out with a force of 4 lbs. We have only, then, to enlarge the area of the piston *c* to obtain any multiplication of the force exerted at *a*. If the area of *c* is 1000 in., that of *a* being 1 in., a pressure of 1 lb. on *a* becomes a pressure of 1000 lbs. on *c*; and if we make the pressure on *a* 1 ton, that on *c* will be 1000 tons. This seemingly wonderful multiplication of power has received the name of the *hydrostatic paradox*. It is, however, nothing more than what takes place in the lever, when 1 lb. on the long arm is made to balance 100 lbs. on the short arm.

If the pressure we have supposed exerted on the piston *a* arose from a pound of water poured into the tube above it, it would continue the same though the piston were removed. The pound of water in the tube is then pressing with its whole weight on every square inch of the inner surface of the box—downwards, sidewise, and upwards. The apparatus called the *hydrostatic bellows* acts on this principle (see Fig. 2). It consists of two stout circular boards connected together by leather in the manner of a bellows, B. The tube A is connected with the interior; and a person standing on the upper

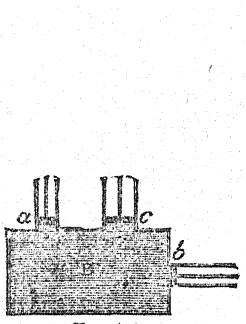


Fig. 1.

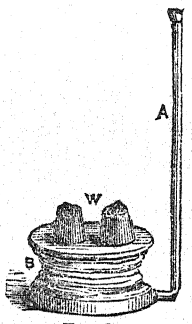


Fig. 2.

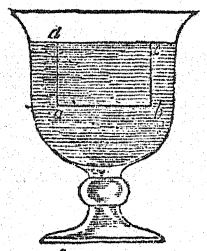


Fig. 3.

board, and pouring water into the tube; may lift himself up. If the area of the upper board is 1000 times that of the tube, an ounce of water in the tube will support 1000 ounces at W. It is on the same principle that the hydraulic press (q.v.) depends.

1. *Equilibrium of Liquids.*—After this explanation of the fundamental properties of liquids, it may be enough to state the two conditions of fluid equilibrium which directly flow from it. (1.) Every molecule of the liquid must be solicited by equal and contrary pressures in every direction. This is a corollary from liquid mobility. (2.) The upper molecules of a liquid, which are free, must form a surface perpendicular to the impressed force. The truth of this will sufficiently appear from the proof that the surface of a liquid at rest under gravity must be what is called horizontal. It can be shown to be a consequence of the primary property of "pressing equally in all directions." For let *da* and *cb* be vertical lines, or lines in the direction of gravity; and *ab* a plane at right angles to that direction, or horizontal. A particle of the liquid at *a* is pressed by the column of particles above it from *a* to *d;* and the like is the case at *b*. Now, since the liquid is at rest, these pressures must be equal; for if the pressure at *b*, for instance, were greater than at *a*, there would be a flow of the water from *a* towards *b*. It follows that the line *ad* is equal to *be*, and hence that *dc* is parallel to *ab*, and therefore horizontal. The same might be proved of any two points in the surface; therefore the whole is in the same horizontal plane.

2. *Pressure of Liquids on Surfaces.*—The general proposition on this point may be stated thus: *The pressure of a liquid on any surface immersed in it, is equal to the weight of a column of the liquid whose base is the surface pressed, and whose height is the perpendicular depth of the center of gravity of the surface below the surface of the liquid.* See article Center of Pressure. The pressure thus exerted is independent of the shape or size of the vessel or cavity containing the liquid.

3. *Buoyancy and Flotation.*—As a consequence of the proposition regarding the pressure of liquids on surfaces, it can be shown that when a solid body is immersed in a liquid, it loses as much weight at that of an equal bulk of the liquid weighs. It follows that, if a cubic foot of the liquid and of the solid have equal weights, the solid will lose all its weight, or will remain in the liquid wherever it is put; if a cubic foot of the

liquid weigh more than one of the solid, the solid will not only lose all its weight, but will rise up, and that with a force equal to the difference; if a cubic foot of the liquid weigh less than one of the solid, the solid will lose weight, but will sink.

When a solid swims, or rises and *floats* on the surface of a liquid, the next problem of hydrostatics is to determine how much of it will be below the surface. We have already seen that any solid in a liquid is pressed upward with a force equal to the weight of the water whose room it occupies. Now, a floating body must be pressed up with a force equal to its own weight, otherwise it would sink lower; hence, *a floating body displaces its own weight of the liquid.* A solid, as AB in Fig. 4, sinks until the space occupied by the part B immersed would contain an amount of water equal in weight to the whole solid AB.

FIG. 4.

As the buoyancy of a body thus depends on the relation between its weight and the weight of an equal bulk of the liquid, the same body will be more or less buoyant, according to the density of the liquid in which it is immersed. A piece of wood that sinks a foot in water, will sink barely an inch in mercury. Mercury buoys up even iron. Also a body which would sink of itself, is buoyed up by attaching to it a lighter body; the bulk is thus increased without proportionally increasing the weight. This is the principle of life-preservers of all kinds. The heaviest substances may be made to float by shaping them so as to make them displace more than their own weight of water. A flat plate of iron sinks; the same plate, made concave like a cup or boat, floats. It may be noted that the buoyant property of liquids is independent of their depth or expanse, if there be only enough to surround the object. A few pounds of water might be made to bear up a body of a ton weight; a ship floats as high in a small dock as in the ocean.

4. *Stability of Floating Bodies.*—Conceive *abd* (Fig. 5) to be a portion of a liquid turned solid, but unchanged in bulk; it will evidently remain at rest, as if it were still liquid. Its weight may be represented by the force *cg*, acting on its center of gravity *c*; but that force is balanced by the upward pressure of the water on the different parts of the under surface; therefore, the resultant of all these elementary pressures must be a force, *cs*, exactly equal and opposite to *cg*, and acting on the same point *c*, for if it acted on any other point, the body would not be at rest. Now, whatever other body of the same size and shape we suppose substituted for the mass of solid water *abd*, the supporting pressure or buoyancy of the water around it must be the same; hence we conclude that *when a body is immersed in a liquid, the buoyant pressure is a force equal to the weight of the liquid displaced, and having its point of application in the center of gravity of the space from which the liquid is displaced.* This point may be called the *center of buoyancy.*

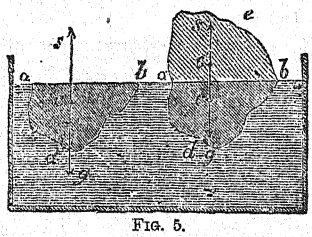


FIG. 5.

We may suppose that the space *abd* is occupied by the immersed part of a floating body *aebd* (Fig. 5). The supporting force, *cb*, is still the same as in the former case, and acts at *c*, the center of gravity of the displaced water; the weight of the body must also be the same; but its point of application is now *c'*, the center of gravity of the whole body. When the body is floating at rest or in a state of equilibrium, this point must evidently be in the same vertical line with *c*; for if the two forces were in the position of *cs*, *c'g* (Fig. 6), they would tend to make the body roll over. The line passing through the center of gravity of a floating body and the center of gravity of the displaced water, is called the *axis of flotation.*

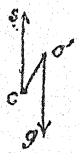


FIG. 6.

The equilibrium of a floating body is said to be *stable*, when, on suffering a slight displacement, it tends to regain its original position. The conditions of stability will be understood from the accompanying figures. Fig. 7 represents a body floating in equilibrium, G being its center of gravity, B its center of buoyancy, and AGB the axis of flotation, which is of course vertical. In Fig. 8 the same body is represented as pushed or drawn slightly from the perpendicular. The shape of the immersed portion being now altered, the center of buoyancy is no longer in the axis of figure, but to one side, as at B. Now, it is evident that if the line of direction of the upward pressure—that is, a vertical line through B—meets the axis above the center of gravity, as at M, the tendency of the two forces is to bring the axis into its original position, and in that case the equilibrium of the body is stable. But if BM meet the axis below G, the tendency is to bring the axis further and further from the vertical, until the body get into some new position of equilibrium. There is still another case; the

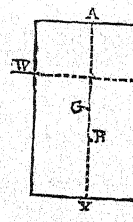


FIG. 7.

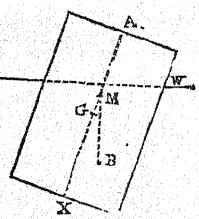


FIG. 8.

line of support or buoyancy may meet the axis in G, and then the two forces counteract one another, and the body remains in any position in which it is put; this is called *indifferent* equilibrium. In a floating cylinder of wood, for instance, B is always right under G, in whatever way the cylinder is turned. When the angles through which a floating body is made to roll are small, the point M is nearly constant. It is called the *metacenter;* and its position may be calculated for a body of given weight and dimensions. In the construction and lading of ships, it is an object to have the center of gravity as low as possible, in order that it may be always below the metacenter. With this view, heavy materials, in the shape of ballast, are placed in the bottom, and the heaviest portions of the cargo are stowed low in the hold. See SPECIFIC GRAVITY and AREOMETER.

HYDROSULPHU'RIC ACID (HS), known also as *sulphureted hydrogen, sulphydric acid,* and *hydrothionic acid,* is a natural gaseous constituent of many mineral waters, as, for example, those of Aix-la-Chapelle in Germany, Barèges in France, Abano in Italy, and Harrogate in England, and is evolved from fumaroles and volcanoes. It is formed spontaneously wherever sulphurous organic matters are undergoing putrefaction, as, for instance, in stagnant sewers and cess-pools, and in waters charged with organic matter and sulphates, especially sulphate of lime.

There are several ways of preparing this gas, which is very extensively used in laboratory operations. The following is that which is most commonly employed. Sulphide (the old sulphuret) of iron, in small fragments, is placed in a bottle, and dilute sulphuric acid is added. Water is decomposed, its hydrogen combining with the sulphur of the sulphide to form hydrosulphuric acid, which escapes as a gas, while its oxygen enters into combination with the iron, forming oxide of iron (FeO), which unites with the sulphuric acid to form the ordinary protosulphate of iron or green vitriol, which remains in solution. The reaction is expressed by the equation:

Sulphide of Iron.		Sulphuric Acid.		Hydrosulphuric Acid.		Sulphate of Iron.
FeS	+	HO,SO_3	=	HS	+	FeO,SO_3

Hydrosulphuric acid is a colorless gas of a strong and very nauseous odor, resembling that of rotten eggs. It consists of two volumes of hydrogen and one volume of sulphur vapor condensed into two volumes, which form its combining measure. It is about seventeen times heavier than hydrogen. By pressure it is liquefied, and by the additional application of cold, it may be obtained in the solid form (see GASES). Water dissolves, at 59°, 3.23 volumes of this gas, but the solution soon becomes milky when exposed to the air, in consequence of the oxygen of the air combining with the hydrogen of the gas, and sulphur being precipitated. It is highly combustible, and burns with a pale blue flame, producing water and sulphurous acid, and, generally, a deposit of sulphur. It has a weak acid reaction, and forms one of the hydracids. Although a feeble acid, it combines readily with bases.

Its use as a reagent is dependent on the fact, that many of the sulphides which it forms with metallic oxides are insoluble in water, and are thrown down from solutions as precipitates with characteristic colors. Thus the gas, or a watery solution of it, gives an orange precipitate with the compounds of antimony, while with those of arsenic it gives a yellow—with those of lead and of silver, a black—and with those of zinc, a white precipitate.

The air of a room slightly impregnated with this gas may be breathed with impunity, but a small quantity of the undiluted gas inspired produces faintness, and its respiration, in a very moderate proportion, was found by Thenard to prove fatal—birds perishing in air which contained $\frac{1}{1500}$th, and a dog in air containing $\frac{1}{800}$th part of this gas. Its poisonous effects are best counteracted by the inhalation of very diluted chlorine gas, which may be readily obtained from a little chloride of lime placed in the folds of a napkin moistened with vinegar.

A very minute trace of this gas may be detected by placing a piece of paper, moistened with a strong solution of sugar of lead, over the vessel or aperture—as, for instance, over an opening in a drain—from which we think it is escaping. If it be present, a more or less black—often only a brown—tint is developed after a few minutes, in consequence of the formation of sulphide of lead.

HYDROTHO'RAX (derived from *hydōr*, water, and *thorax*, the chest) is the term applied to dropsical collections in the pleura (q.v.), a closed serous sac enveloping the lung on either side. When it exists to any extent, the pressure which it exerts on the lungs impedes the passage of the blood through them, and occasions difficulty of breathing, lividity of countenance, etc.; and more or less dropsy in the face, ankles, etc., soon appears. The physical signs by which the disease can be detected are too purely professional for these pages.

The causes of hydrothorax are various. It may depend upon inflammation of the secreting membrane, or it may be a consequence of organic disease of the heart or lungs. With regard to treatment when the disease seems to depend upon inflammation of the pleura, great advantage may often be derived from occasional cupping and repeated blistering. The most popular internal remedy is a combination of squill and

either calomel or blue pill, which must be continued till slight symptoms of salivation manifest themselves.

HYDROZO'A. See ZOOPHYTES.

HYE'NA, a genus of digitigrade carnivorous quadrupeds, included in the genus *canis* by Linnæus, and by some naturalists referred to the family *canidæ*, but now more generally to *viverridæ*, whilst the dentition connects it even with *felidæ*. Hyenas have six incisors and two canine teeth in each jaw, five molars on each side in the upper jaw, and four in the under. They seize an object with so firm a hold, that, among the Arabs, they are proverbial for obstinacy. The vertebræ of the neck sometimes become anchlosed in old hyenas. The hind-quarters are lower and weaker than the fore-quarters of the body, so that hyenas move with a shambling gait. The body is covered with rather long coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is rather short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor by which hyenas are characterized. Hyenas eat carrion, as well as newly killed prey, and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses that, if left to rot, would greatly pollute the air. They sometimes attack cattle, especially if they flee, but rarely man, though they sometimes seize children. During the day they hide themselves in caves, old rock tombs, ruined edifices, etc.; by night, they roam singly or in packs in quest of prey. They prowl about towns and villages, and often dig up corpses that have not been very deeply buried. This, together with their aspect and manners, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being very completely tamed, and show an attachment to man similar to that of the dog; they have even been used as watch-dogs. Hyenas are found only in Africa and the s. of Asia, not extending to the farthest s. of the latter continent.—The STRIPED HYENA (*H. vulgaris* or *striata*) is found both in Asia and Africa, and there are several varieties considerably different in size, color, etc. The smallest hyenas are of the size of a large dog.—The SPOTTED HYENA (*H. crocuta*) inhabits s. Africa. It is rather smaller than the largest varieties of the striped hyenas, but is more fierce and dangerous. It is called TIGER-WOLF by the colonists of the cape of Good Hope. Besides its ordinary howling, which it emits very freely in its nocturnal roamings, this hyena often indulges in an expression of gratification or of some passion, resembling hysterical laughter, whence it has acquired the name of the LAUGHING HYENA. The general color is ochry gray, with thinly scattered small round brown spots, and sooty muzzle and feet.—The WOOLLY HYENA (*H. villosa*) is a smaller s. African species.

In consequence of the bones which hyenas eat, their dung forms solid yellowish-white balls, of compact earthy fracture, the *album græcum* of the old materia medica.

HYÈRES, or HIÈRES, a small t. of France, in the department of Var, is situated 3 m. from the Mediterranean, and 8 m. e. of Toulon. It is celebrated for the beauty of the situation and the mildness of the climate, and is therefore much resorted to by foreigners suffering from chest or nervous complaints. Pop. '76, 6,797. Near the coast lie the Iles d'Hières, called by the ancients the Stœchades, which, with the exception of the military garrisons of a few forts, are uninhabited. Here the heat of the climate is tempered by the sea-breezes, and the season seems an eternal spring.

HYGE'IA—in the classical mythology, the goddess of health—the daughter of Æsculapius. She was worshiped at Athens, Corinth, Argos, and other important cities, and in works of art is usually represented as a blooming virgin, with a snake, the symbol of health, which drinks from a cup held in her hand. HYGEIA is the name of one of the newly discovered planetoids (q.v.).

HYGIENE (HEALTH, *ante*), the science of health, also called sanitary science. The word is originally derived from Hygeia, the goddess of health, a daughter of Æsculapius. Hygiene includes attention to diet, to exercise, to mental and physical habits, as well as to clothing, climate, state of the weather, condition of dwellings and of the streets and sewers of the town, or of the surface of the country. It is a subject which has received various degrees of attention in all ages, but as a science it is of modern date. However much attention may have been given to the rules and practice of exercise, and to bathing and habits of cleanliness by ancient nations, and however much knowledge they may have had of the advantages to health which were derived from their games, their baths and other observances, their want of knowledge of many of the causes of disease was a barrier to scientific knowledge. An individual may be ever so particular in the care of his person, but if he habitually breathe an atmosphere loaded with malaria, he will almost certainly at some time be prostrated with some form of fever. If science has never analyzed for him the effluvia of the cess-pool or the pile of putrescent matter lying near his dwelling he cannot have any other knowledge which will lead him to avoid the deleterious influences of their presence. Neither can he form rules of eating and drinking, or even of exercise or bathing, which will not in some degree violate the laws of health, unless he has an extensive knowledge of the principles of physiology. Now, physiology is a modern science, and although it enables us to avoid many dangers,

it is still so far in its infancy as to allow us at times to adopt erroneous habits, and our knowledge of malaria and of its propagation does not always tell us how to employ the most efficient measures against it. How then could the ancients protect themselves against the ravages of the plagues and pestilences which periodically carried them off by hundreds of thousands? And it must be confessed that modern nations, until within a very recent period, even within the lives of persons now living, have known but little more than the ancients of any practical preventives against the ravages of diseases; and moreover, it must with shame be confessed that at the present time, and in some of the most enlightened and luxurious cities, whose municipal authorities have only to ask to receive the most scientific advice from the medical profession and the aid of the most accomplished engineers, methods for riddance of pestilential matter are employed but little better than those which would be adopted by barbarians.

Omitting the considerations of the sanitary measures pursued by the Assyrians, Egyptians, Greeks, and Romans, some of which are recorded in architectural monuments preserved to this day, we find that in England in the time of Edward II., among other ordinances of a sanitary nature, there was one forbidding the sale of muzzled swine's flesh; and in the reign of Richard II. one to prevent the pollution of rivers, and subsequently, including the reign of Elizabeth, ordinances for the inspection and cleansing of sewers, and the prevention of overcrowding in tenements. But notwithstanding the attention thus early given to the subject of the pollution of rivers, some of the water that is supplied to the city of London to-day receives pollution from the sewage of towns. Much, however, has been done by men of science to point out the manner of effecting sanitary reforms, and it may reasonably be hoped that the day is not distant when as a rule municipal authorities will be compelled by process of law, or by public sentiment, if not impelled from patriotic or public spirited motives, to employ the best methods of introducing pure and non-malarialized water into our cities, and also to clean the streets and dispose of the offal and refuse in such manner as not to sacrifice human life, or even to shock public decency or discourage private enterprise.

Hygiene may be variously classified, according to its relations, and the objects in view. There is the hygiene of the individual, of the family, and of the municipality or state; which may be denominated personal, domestic, and public hygiene. Personal hygiene has little to consider beyond questions of diet, cleanliness of person, habits of thought and study, and of morals and locality of residence. Domestic hygiene regards the condition of the whole household, the apportionment of sleeping apartments to different members, the general regulation of meals and the preparation of food, and is brought into more immediate relations with public hygiene, as the householder will often need to have intercourse with the public authorities. Public hygiene has the consideration of measures for the laying out of a city, for the disposal of its refuse, for the supply of water, and the occasional enforcement of quarantine regulations. In a more enlightened sense it must also have regard for the education of the inhabitants in such a manner as will dispose them to cleanly and thrifty habits. Hygiene may be also divided into mental and physical. The former will necessarily include many questions that belong to the latter, for the healthy action of the mind depends to a great extent upon the health of the body. A sufficient amount of sleep ought to be taken to refresh the powers of the mind as well as those of the body, and that sleep ought not to be much disturbed by dreams. It is a matter of common experience that retiring at night with too full a stomach—and with some persons with any food in the stomach—is provocative of disturbing dreams. The thoughts should be calm, and mental exercise, as well as physical, should be regularly taken. Of course there are those whose occupation demands varied, sometimes excessive exertions, and who must be "a law unto themselves." No rules of mental hygiene are possible with them, except that they shall keep the blade of the intellect as keen and as bright as possible by a fair diet, what exercise they can find time to enjoy, and be always ready for an intellectual encounter. There are lawyers and other professional men, journalists, physicians, and a few public officers whose duties are so thoroughly wound up in the progress and success of causes and enterprises, in questions of life and death, and the loss or the rescuing of fortunes, that there is scarcely such a word as *rest* with any practical import to them. But the great time for practically applying the laws of mental hygiene is during the years of childhood and youth, before the struggles of life commence. The method of teaching the child should be of the simplest as well as of the most comprehensive character, and the periods should be frequent during which its mind is completely taken away from all serious study, and allowed to come to a perfectly natural and passive condition by mirthful and affectionate enjoyment. Let the schoolrooms to which youth are sent be commodious and well ventilated, and after these advantages are secured let them not be thrown away by overcrowding. It is questionable whether the bringing together of over one thousand, or even that number, of children in one building, even though a large one, is not in violation of sanitary principles. Too many studies should not be required, so that hours which should be given to recreation or sleep will not be occupied, as is now too often the case, with laborious efforts of study, which often do little more than produce a disturbed and unrefreshing sleep, and pervert or destroy the appetite for wholesome food. As to moral hygiene, which is a part of mental, it is necessary to say only that the strict observance of those laws which are

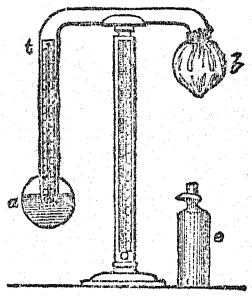
inculcated by Christianity and sought to be enforced by the civil authorities of all enlightened nations, will be conducive not only to soundness of the whole mind, but also to soundness of the whole body.

Physical hygiene presents itself in various aspects, embracing exercise, diet, occupation, etc. Exercise is an important element of hygiene. See EXERCISE, GYMNASTICS, *ante*. For the hygiene of diet, see DIET, *ante*. By the hygiene of occupation or employment is meant the hygienic influence of different employments upon the individual. It is evident that the occupation of a lawyer or journalist or physician has vastly different hygienic relations from that of a shoemaker or carpenter. It is evident that a carpenter will need but little more exercise than is given him by his occupation; but his diet, and his time and manner of sleeping, and his habits of cleanliness and bathing, will have considerable importance. It is hardly necessary to say that he should have a generous diet, should occupy an airy and well-ventilated chamber for sleeping, and that his food shou'd usually be different from that of the shoemaker, lawyer, or doctor. It may be said in general that active laboring men, like carpenters, wheelwrights, and farmers, may partake of food which takes a considerable time to digest, with more advantage than sedentary men can. Pork and corn-cake or bread is a nutritious and sustaining diet to an active laborer, but should not form the habitual diet of a sedentary person. But the influence which the occupation of a person may have upon his health is a hygienic question which can only be hinted at in a brief treatise. The rules of hygiene are subject to change according to circumstances. That which is beneficial to one person is often injurious to another, and nothing but the application of the broadest common sense in the most catholic spirit can be expected to apply to questions as to what any person ought to eat, to drink, or as to how many miles he or she ought to walk every day. In conclusion, it may be remarked of public hygiene that it can only be regulated by the enforcement of sanitary laws; and that to be efficient, especially in cities, they need to have reference to many things. One of the most important questions of public hygiene is the cleaning of streets and matters connected therewith. Filthy streets are productive of disease not only by the generation of poisonous gases, but also the dust which results from the long-continued trituration of excrementitious and decaying substances is extremely injurious to the mucous membrane of the air passages, and productive of contamination to blood and tissue. The habit of casting the sweepings of houses and stores, upon the sidewalks, especially during the hours in which pedestrians are passing, which is so prevalent in most of our cities, is a greater evil than many suppose. The dust of these places is often of the most objectionable character, containing the germs of contagion, and there is no doubt that many filthy diseases are propagated in this manner. It is impossible to see how such abuses can be remedied, except by municipal regulation.

Public conveyances are frequent causes of disease from various sources. The dust which is allowed to collect in street cars, and also ordinary steam railway cars, is of itself a frequent cause of diseases of the air passages; but compared to the evils which result from overcrowding and bad ventilation, it is of minor importance. The overcrowding which is deliberately practiced on some of the street railroads, coupled with the draughts of cold air from windows opened regardless of comfort, is undoubtedly a considerable factor in the death-rate of our large cities. Pneumonia, pleurisy, bronchitis, and laryngitis are frequent results of street-car exposure. But one of their greatest evils, and one not yet sufficiently recognized by the public, although well known to the medical profession, is the want of attention paid to the smoothness of the track and the springs of the cars. This is commonly regarded as a matter of comfort, but this is its least important aspect. There is a disease recognized in legal medicine called railroad disease. It is a nervous affection, caused by the continuous vibration of the cars. This vibration cannot be entirely avoided on rapid trains, but on some roads is so nearly so that little mischief probably results from this cause. On street cars undue jarring should not be permitted. When they are properly supplied with springs, and the seats cushioned, all injurious vibrations will be avoided, even when the track is not perfectly smooth. A delicate lady is often seriously injured by riding in a car on a bare wooden seat, without a cushion to relieve the jar resulting from the imperfect springs, and physicians are constantly meeting with patients whose diseases are directly traceable to this cause. Several years ago, when the street cars, which were then cushioned, became so filthy as to be known agents of contamination, the abandonment of cushions was popularly hailed as a relief. It was, however, only a partial relief, from filthiness; it has been injurious in another direction, but there is no reason why the seats of all public conveyances, which are paid, as a rule, in proportion to the amount of wear entailed by travel, cannot be comfortably cushioned and kept clean. Hygiene has its thousand relations to all the habits and conditions of life, and although many of them lie within the limits of private life and cannot be subjected to legal interference, gross violations of sanitary laws ought not to be permitted in public establishments. See WARMING AND VENTILATION.

HYGROM'ETER (Gr. *hygros*, moist, *metron*, measure), an instrument for measuring the quantity of moisture in the atmosphere. The earlier forms of hygrometer depended upon the property possessed by some substances of readily absorbing moisture from the air, and being thereby changed in dimensions or in weight. Of this kind was the hair

hygrometer of Saussure, in which a hair, which expands and contracts in length according as the air is more or less moist, was made to move an index; a similar instrument was the whalebone hygrometer of Deluc; but as other causes as well as moisture affect such instruments, they afford no accurate indications. The most perfect hygrometer, theoretically, is that of J. F. Daniell (q.v.). It consists of two bulbs connected by a bent tube, as represented in the figure, and inclosing a thermometer, together with some ether and vapor of ether, the air having been expelled. The bulb, *b*, is covered with muslin, and *a* is either blackened or coated with metal. The observer's hand is placed for a short time on *b*, to drive the ether into *a*, leaving *b* and the tube filled with vapor of ether. A little ether is then dropped from a flask, of the form *c*, on the muslin-covered bulb; evaporation instantly takes place, and produces a cooling of *b*, which condenses the vapor inside; a fresh evaporation from *a* fills the vacuum, which is again condensed by dropping ether on *b*, and the process is repeated till the temperature of *a* is so reduced by successive evaporations (see EVAPORATION), that *dew* begins to be formed on the outside of the bulb. At the instant this occurs, the height of the mercury in the two thermometers is accurately noted, the one giving the dew-point temperature, and the other the temperature of the air. The actual quantity of moisture contained in a cubic foot of air can now be readily found from the following empirical formula: weight of moisture in grains $= \frac{5656.2}{448 + t} \times p$; where t is the temperature of the air at the time of observation, and p (found from tables) the elasticity of vapor at the temperature of the dew-point. The evident defects of this instrument are, first, its rapidity of operation, so that no time is allowed for the glass, ether, and thermometer to come to the same temperature, and, in consequence, the dew-point is given higher than it actually is; secondly, its costliness, owing to the great consumption of ether; and, thirdly, its uselessness in tropical countries, owing to the difficulty of preserving the ether in a fluid state. Daniell's hygrometer was used at the royal observatory, Greenwich, from 1840—the commencement of meteorological observations—till 1847, when it was superseded by the more convenient instrument, the WET AND DRY BULB THERMOMETERS. This instrument consists of two ordinary thermometers—one has its bulb bare, and thus shows the temperature of the air; the other has its bulb covered with muslin, which is kept wet by a cotton wick dipping into water. The evaporation from the muslin, and consequent cooling of the bulb, being in proportion to the dryness of the air, the difference between the readings of the two thermometers is greatest when the air is driest, and zero when it is completely saturated. The readings of the thermometers being taken, the elastic force of vapor at the dew-point is calculated by the formula of Dr. Apjohn (*Proceedings of the Royal Irish Acad.*, 1840):



$$(1)\ F = f - \frac{d}{88} \cdot \frac{h}{30};\quad (2)\ F = f - \frac{d}{96} \cdot \frac{h}{30};$$

the first formula to be used when the wet thermometer is above, and the second when it is below, the freezing-point (32°). In these formulæ, F is the elastic force of vapor at the dew-point, which has been determined for different temperatures by Regnault from carefully conducted experiments; *f*, the elastic force at the temperature of evaporation (or reading of wet bulb); *d*, the difference between the dry and wet bulbs; and *h*, the height of the barometer. From this the quantity of moisture in a cubic foot of air, etc. can be found as before. To dispense with these troublesome calculations, the *Hygrometric Tables* of Mr. Glaisher may be used.

HYKSHOS, the name of an Egyptian dynasty, generally known as the Shepherd Kings, derived from *hyk*, a ruler, and *shos*, a shepherd; or, according to another version, from *hyk*, a captive, and *shos*, a shepherd. According to Josephus and Africanus, they consisted of six or eight kings, named (1), Salatis, Silitis, or Saites, who reigned 19 or 15 years; (2), Beon, Banon, or Bnon, who reigned 43 or 44; (3), Apachnas, Apachnan, or Pachnas, who reigned 36 or 61 years; (4), Apophis, Aphosis, who reigned 61; (5), Anas, or Anan, who reigned 50; (6), Archles, who reigned 49; (7), Assis, or Asseth, who reigned 49 years and 2 months; and (8), Apobis, who reigned 61 years. The greatest discrepancy exists in the names and their arrangement, and as to the total number of years of the dynasty. Manetho, according to Josephus, states that they reigned 511 years, but the total of the reigns he cites amounts to only 259 years 10 months; while Africanus makes their duration 284 years, and Eusebius 103. Africanus makes the shepherds consist of the 15th, 16th, and 17th dynasties, and to have ruled 953 years, but only gives the names and reigns of one, which he calls the 15th; while Eusebius makes them more correctly the 17th dynasty. They are stated in the Egyptian annals to have been a race of conquerors sprung from the east, who, under Salatis, their first king, took Memphis, and rendered tributary the whole of Egypt, and fortified the city of Avaris, on the e. of the Bubastite arm of the Nile, where he maintained a garrison of

240,000 soldiers. Their oppression, however, drove the Egyptians to revolt, and under Taakan, the predecessor of Aahmes or Amasis I. of the 18th dynasty, a religious quarrel about the temples of Ra or the sun, and of Set, the god of the Hykshos, seems to have commenced, when a long war broke out, which ended under Aahmes, with the siege of Avaris and a king who is called Misphragmuthosis, supposed to be a Thothmes, finally drove them out. The monument of an officer, named Aahmes-Penneben, at El Kab, recounts this siege and his exploits. Finally, according to Manetho, they departed under treaty. The great interest attaching to the Hykshos is that they were confounded with the Hebrews, or supposed to be the monarchs under whom Joseph entered Egypt, by the old ecclesiastical writers. In the monuments and the papyrus of Turin in which portions of their names occur in the list of the kings, they bear the full titles of monarchs, although the papyri state that there were no kings in Egypt at the time, and that Taakan was only himself a *hek*, or prince of the south. The Hykshos, on a contemporary inscription remaining at El Kab, are called *mena*, or shepherds. The Hykshos were by no means the devastating conquerors described by the historian. They entered Egypt, it appears from the monuments, about the 14th Egyptian dynasty, and were content with inscribing their names and titles on the monuments of their predecessors, the name of Appapus having been found on a colossus of Sebakhetp III. of the 13th dynasty, and on that of a king of the 14th dynasty at San. Traces of that of Saites or Salatis have been also found at Tel-Mokdam or Cynopolis. The greatest divergence of opinion has prevailed amongst authors as to their race and origin. Josephus calls them Hebrews or Arabs; the Syncellus, Phenician shepherds. They have also been supposed to be Idumeans, Ishmaelites, or Scythians. Their physiognomy seems to indicate a Semitic origin, while their worship of Set connects them with the Khita, a people to the n. of Palestine, on the confines of Mesopotamia. The names of the kings exhibit no foreign peculiarities; some are purely Egyptian. As regards the date of the Hykshos dominion, the most conflicting opinions have prevailed amongst scholars. Bunsen makes their rule end 1639 B.C.; Lepsius, 1842 B.C. Placing, however, the discovered date of Thothmes III., 1445 B.C., in his 16th year, the close of Hykshos dominion must have ended about 1500 B.C.

Bunsen, *Egypt's Place*, vol. ii. pp. 405, 578; Lepsius, *Königsbuch;* Boïkh, Manetho, p. 231; De Verria, *Rev. Arch.* (1861), vol. iv. p. 249; Mariette, *Rev. Arch.* (1861), vol. iii pp. 97, 247, 337.

HYLÆOSAU'RUS (Gr. forest-lizard), a huge dinosaurian reptile, found in the Wealden strata of Kent and Sussex. Fragments of different individuals have been found sufficient to give an approximate notion of the affinities and great size of this reptile. The bones of the head have not yet been observed; its teeth were comparatively small, and close set; they seem to indicate that it was a vegetable eater. The body was broader than high, and terminated in a long slender flexible tail; the limbs were relatively short; the skin was covered with scutes and tubercles; and a row of very large thin angular bony spines extended down the back, and formed a serrated dermal crest, like the horny spines of the modern iguana. It is supposed to have attained a length of 25 feet. The remains of only one species have been found; it has been named *H. Oweni.*

HY'LIDÆ. See TREE FROGS, *ante.*

HYLOBATES. See GIBBON, QUADRUMANA, and VERTEBRATA.

HY'MEN, or HYMENÆ'US, in Grecian mythology, the god of marriage; but originally, the word seems to have denoted only the bridal-song which was sung by the companions of the bride as she went from her father's house to that of the bridegroom. The god Hymen is first mentioned by Sappho. The legends concerning him are various; but he is generally said to be a son of Apollo and some one of the Muses. He is represented as a boy with wings and a garland, a bigger and graver Cupid, with a bridal-torch and a veil in his hands.

HYMENOP'TERA (Gr. membrane-winged), an order of insects, containing a very great number of species, estimated at about one-fourth of the whole class, and of which some, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees. See BEE. The antennæ are generally slender, but often exhibit differences in the sexes of the same species. The wings are four in number, the first pair larger than the second, the wings of the same side united in flight by little hooks. The wings, when at rest, are laid one over another horizontally over the body. The wings are entirely membranous, not reticulated as in the *neuroptera*, but with comparatively few nervures, the arrangement of which is so constant in the whole order that particular names have been given to them and to the space between them, and their diversities have been made use of in classification. The wings are wanting in the imperfectly developed females (*neuters*) of some. Besides the ordinary eyes, all the hymenoptera have three small simple (or *stemmatic*) eyes on the top of the head. The abdomen is generally united to the thorax by a slender pedicel. The abdomen of the females is generally furnished with an organ capable of being protruded, but for different purposes in different sections of the order, it being in some of the hymenopterous tribes an ovipositor or borer, and in others

a sting. The hymenoptera in their perfect state generally feed on honey, but some of them prey on other insects, which are the food of the larvæ of a greater number; whilst the larvæ of some feed on various vegetable substances. The metamorphoses of the insects of this order are perfect; the larvæ are generally—although not in all the families—destitute of feet; the pupæ take no food. The hymenoptera are remarkable for the dilatation of the *trachea* or air-tubes into vesicles, and the general perfection of the respiratory system. The instincts and even apparent intelligence displayed by some of them—particularly the *social* kinds, which live in communities—have excited admiration from the earliest times.—The order is divided into two sections: *terebrantia*, having an ovipositor; and *aculeata*, having a poison-reservoir and sting. To the former belong saw-flies, gall-flies, ichneumons, etc.; to the latter belong ants, bees, wasps, etc.

HYMET'TUS, a mountain in Attica, now called Trelo Vouni, situated to the s.e. of Athens, and famous among the ancients for its honey and its marble. The honey still retains its reputation.

HYMN, a canticle of praise or of prayer addressed to the divine honor. The word in its strict acceptation supposes a certain metrical structure, or at least some kind of rhythmical cadence. The use of hymns dates from the earliest days of Christianity (Matt. xxvi. 30; Col. iii. 16); but our information as to the hymns of the early ages, and still more as to their authors, is extremely imperfect. The *Te Deum* is variously ascribed to St. Ambrose, St. Hilary, to Abundius, and to a monk named Sissabul. To Prudentius, with greater certainty, are assigned the *Hymn of Holy Innocents, Salvete Flores Martyrum*, and the *Ales Diei Nuntius*. Even the names of the authors of the more modern hymns are often involved in mystery; but some of the most esteemed hymns are known as the productions of Sedulius, of Fortunatus, of Paul the deacon, of St. Bernard, and St. Thomas. The number of hymn-writers in the modern languages is so great as to preclude the possibility of any enumeration. The most complete modern collection of mediæval Latin hymns is Mone's *Hymni Latini Medii Ævi* (1856).

HYMNOLOGY (HYMN, *ante*). I. *Scripture psalms and hymns.* The sacred writings record strains of poetry, music, and song which furnish a model for the praises of the church through the ages. The book of Job, generally regarded as the oldest, declares that, at the creation, "the morning stars sang together and all the sons of God shouted for joy." Moses led Israel into the wilderness with a song of praise—"I will sing unto the Lord, for he hath triumphed gloriously"—and brought them to the end of it with a doxology—"There is none like the God of Jeshurun, who rideth on the heaven in thy help." Centuries after, during troublous times, Deborah's song mingled a woman's tenderness with a warrior's joy—"Lord, when thou wentest out of Seir, the earth trembled and the heavens dropped." Afterwards Hannah's song is given—"The Lord maketh poor and maketh rich." From the heights of Bethel, in Samuel's day, "a company of prophets came down with psaltery and tabret, and pipe and harp." David, the sweet singer of Israel, composed among his flocks the psalm, "The Lord is my shepherd;" and, when he brought up the ark to Zion, appointed Levites, with instruments of music, to sing, in the worship of the sanctuary, "Give unto the Lord, ye kindreds of the people, give unto the Lord glory and strength." With David other psalmists were united; and yet others, ages after, added to their work. From the depths of the captivity came the mournful strain, "By the rivers of Babylon there we sat down," followed with thanksgiving when the captivity was turned. The Psalms completed have filled with the voice of praise not only the Jewish temple, but also the sanctuaries of all lands where the Lord is worshiped. The voices of the prophets repeated and prolonged the songs of Moses, "God came from Teman and the Holy One from Mount Paran; his glory covered the heavens, the earth was full of his praise." After long silence their last promise was caught up by Zacharias, "Thou, child, shalt go before the face of the Lord to prepare his way;" and Hannah's thanksgiving was renewed, in even gentler tones, from Mary's lips, "He hath put down the mighty and exalted them of low degree." Soon, on the plains of Bethlehem, glad tidings of great joy for all people were proclaimed, and that song of the angels was heard which has floated down the centuries, "Glory to God in the highest, and on earth peace, good will toward men." Mingled with these were various human songs, from that of Simeon, "Lord, let thy servant now depart in peace," on to the hosannas on the mount of Olives and in the temple, the hymn at the institution of the supper, and the ascriptions of praise after the ascension. In the prison of Philippi praises to God were sung at midnight; in the early Christian worship, psalms, hymns, and spiritual songs were directed to be habitually used; and, in the closing of the Revelation, some of the songs of heaven were sent down to instruct and comfort the church on earth: the ascription of holiness and sovereignty to God, "Holy, holy, holy, Lord God almighty;" the song of redemption, "Worthy is the Lamb that was slain;" the song of Moses and the Lamb, "Great and marvelous are thy works;" and the wedding-song of the church in heaven, the bride of Christ, "Alleluia, for the Lord God omnipotent reigneth." II. *Hymns of the ancient Christian church.* Basil quotes an evening hymn from an unknown author. Pliny the younger, at the beginning of the 2d c., in describing Christians by characteristic marks, says that they were accustomed to sing hymns to Christ as to God. The oldest hymn that remains complete from the period of persecution is that of Clement of

Alexandria, which, though not remarkable as a poetical production, gives utterance to the emotions of love and thankfulness to Christ which filled the hearts of the early believers. Many of the Gnostics composed sacred songs in imitation of orthodox Christians as a popular means of diffusing their doctrinal views. One of these, Bardesanes, in the Syrian church of the 2d c., wrote 150 to correspond in number with the Psalms, which he imitated also in style and structure, thus "presenting to simple souls a poisonous cup tempered with seductive sweetness." Ephraem Syrus, on the other hand, representing the Syrian hymnology, endeavored to counteract the Gnostic songs. In the Greek church, Arius, like the Gnostics, wrote hymns "for the sea, the mill, and the highway, which he set to music," and, by the practical Christian spirit which he infused into them, made them more popular than those of the orthodox church. Chrysostom endeavored to neutralize their influence in Constantinople by productions of his own pen. So general was the diffusion of these various songs that Jerome says no one could go into the fields without hearing the plowman singing hallelujahs, the mower hymns, and the vine-dresser David's psalms. The Greek sacred poetry, the work of nine centuries, has been, in a great degree, restricted to the oriental church. Most of it, pervaded with the superstitions of the east, is unfitted for general use. Some of the most valuable, however, has lately been well translated into English by Neale. The hymns of the Latin church are greatly superior in evangelical qualities to those of the Greek. The best of them, through translations and paraphrases, have become familiar in Protestant churches. The most celebrated one is *Te deum laudamus*, sung over all Christendom, and generally attributed to Ambrose, bishop of Milan, about 370 A.D., though some critics now assign it variously to other authors of later date. Many of the Latin hymns, however, like the Greek, celebrate the praises of Mary and the martyrs, and for Protestant ears are marred by various superstitious errors. The famous one of Thomas Aquinas, *Pange, lingua, gloriosi*, it has been said, "fixes the epoch of transubstantiation, the point at which the rhetoric of the pulpits froze into the logic of the schools." During the middle ages large numbers of hymns were written in the cloisters of Germany and France. The authorship of some of the best is uncertain or unknown. *Veni, Creator Spiritus*, translated by Dryden, has been ascribed by some to Charlemagne and by others to Maurus. The *Dies Iræ* was written by Thomas of Celano, and the *Stabat Mater* by Jacopone. III. *Modern hymns.* 1. *German.* The earliest known German hymns belong to the 9th c., at which time, in a few churches, the people continued the old practice of joining in the response *Kyrie eleison* at certain intervals during the singing of the Latin hymns. To this were added a few German rhymes which constituted their earliest hymns, but were restricted at first to popular festivals and pilgrimages. In the 12th c. sacred songs in the national language were more freely written. Some translations also from the Latin became favorites among the people. But while a part of the German hymns were evangelical, others, like many of the Greek and Latin, were extravagant ascriptions to the virgin Mary of the attributes belonging to her divine son. Hymns in the national language were largely used also, by the Flagellants, Bohemians, Waldenses, and other sects, in connection with their study of the Scriptures. The reformation produced a great revival of sacred song throughout Germany as a natural accompaniment of liberty to worship God in the national language and to read his word. Luther not only translated the Bible, but also labored to make the practice and knowledge of music general throughout the land. Besides newly translating many of the best Latin hymns, he was himself the author of more than twenty, most of which have been widely diffused among Protestant nations, some of them being special favorites with all English speaking people. His *Ein feste Burg ist unser Gott*, Heine called the *Marseillaise* of the reformation. The thirty years' war, with all its disasters and sorrows, greatly stimulated the activity of the German mind and produced "a great outburst of religious song" from famous authors, among whom were Opitz, Fleming, Rist, Heermann, and, a little later, Gerhardt, the prince of German hymnists, whose songs are "pervaded by a spirit of cheerful piety showing itself alike in love to God and Christ, to nature, and to mankind." After him followed Frank, Neumark, Silesius, and other well-known names. The school of pietists, which for nearly a hundred years exerted a powerful influence on the religious and social life of Germany, furnished also some celebrated writers of hymns, among whom were Spener and Freylinghausen. The latter published a collection which was cherished by pious persons for several generations. In South Germany Hiller's *Spiritual Songs* was very popular, and is said to be "still the commonest book in Würtemberg next to the Bible." Among the mystics, Arnold and Tersteegen have written some hymns which are justly esteemed. Among the Moravians count Zinzendorf was remarkable as the author of more than 2,000 hymns, some of which are excellent. The prevalence of rationalism in Germany was unfavorable to hymnology. In connection with the "critical doubting" there "sprang up a mania for altering the classical hymns, consecrated, as they were, by so many associations." The alterations consisted in weakening the old strength and changing religion into mere morality. The process was popularly known as "hymn-book watering." It was, however, only partially successful. Often the genuine emotion produced by the singing prevailed over the rationalism of the pulpit. Among the evangelical poets of the time, Gellert, Klopstock, and Cramer are justly esteemed. In South Germany and Austria great progress was marked by the permission which was

officially given to use vernacular hymns in the Roman Catholic churches. Though many of those adopted were translations from the Latin, yet in the original compositions the style of Gellert and Klopstock was imitated, and some of their hymns, even, were introduced. At the present time the reaction from rationalism is marked by a corresponding improvement in the style and quality of the hymns. The German evangelical church has produced in all about 80,000 devotional songs of various sorts and grades. 2. *French.* The Roman Catholic church of France continues to use in its public choral worship the old language of the Vulgate and the Breviary. The sacred songs of Madame Guyon give expression to the deep religious experience, abounding in peace and joy, which, as Wesley says, she truly possessed notwithstanding her errors of opinion and the sufferings brought on herself by her great mistake in following, as inspirations, her own inward impressions, instead of the directions of the written word. In later times, hymns in the French language have been freely used among the lower classes by Roman Catholic missionaries who, learning wisdom from Protestantism, employ against it one of its own chosen instrumentalities. The Reformed French church retains its version of the Psalms which, commenced by Marot in the early part of the 16th c., and finished by Beza, exerted great influence on the religion of the land. Its words, set to native airs, were cherished in the hearts of the people and were sung in the crowded cities, in the vineyards, on the rivers, and even during hunting expeditions of the king. Thus it powerfully aided the work of the reformation. In recent times, Cæsar Malan of Geneva has written many excellent hymns which express warm devotional feeling and clear scriptural truth in simple and flowing verse. Vinet also, in addition to his eminent attainments as a preacher and teacher of theology, was the author of a few hymns that well exhibit the thoughtful and ardent spirituality of his nature. 3. *English.* In England there has been a great deal of sacred poetry that cannot strictly be called hymns. The publications of the Percy society contain specimens of devotional song that are ascribed to the 13th c., and the reign of Edward I. In the 14th c., Chaucer, "the father of English poetry" in its other branches, also "made many a hymn for holy days." After him no eminent poets appeared until the age of Elizabeth, during which the production of sacred verse was greatly increased. Among the writers of it were queen Elizabeth, archbishop Parker, Edmund Spenser, sir Walter Raleigh, lord Bacon, and sir Philip Sydney—joint author with his sister, the countess of Pembroke, of a metrical version of the Psalms. Another version, commenced by Sternhold and finished about 1562 by Hopkins with some assistance from other authors, though deficient in refinement and inferior in other respects, was marked by rugged strength as well as bold harmony and contained some stanzas which are still greatly admired. It became popular and, appended to the book of common prayer, continued long in use. The 17th c. produced the saintly Herbert, the quaint old Quarles with Vaughan, Southwell, and, above all, Milton, who, in addition to *Paradise Lost*, was the author of a noble Christmas hymn and other sacred lyrics. The dramatists also of that age, Ben Jonson, Beaumont, Fletcher, and, greatest of all, the "myriad-minded" Shakespeare, furnished many specimens of sacred poetry which show the influence of Christianity on their intellects and hearts. The version of the Psalms by Rouse, an English Puritan, commended by the house of commons to the Westminster assembly and published in 1646, was generally used by British Presbyterians of that day and still holds its place in many of their congregations both in the old world and the new. At the close of the c., Tate and Brady's version was made, and, although "inflated, smooth, and insipid," soon superseded Sternhold and Hopkins as an appendage to the prayer book, which it still continues to be. Ten years before it, Mason's *Spiritual Songs* appeared, excellent in themselves and destined to prepare the way for still nobler strains that were soon afterwards heard. Dr. Watts, it is said, owed much to them. During all the time thus briefly reviewed, in the English cathedrals and other churches besides the Psalter, the Glorias, Te Deum, and some hymns of the middle ages, continued to be sung. On the threshold of the 18th c. bishop Ken's morning hymn, beginning with *Awake my Soul*, and closing with the doxology, *Praise God from whom all blessings flow*, entered on that stage of duty which now, like the sun, encircles the earth. About the same time Isaac Watts wrote for a single congregation the first of the "songs before unknown," many of which have been cordially adopted by nearly all denominations of Protestant Christians. His cradle hymn has been sung in myriads of homes, and his divine songs for children, charming to them, have been acceptable to men of gifted minds. It is a pleasing coincidence that Ken's doxology and Watts's spiritual songs, which are now sung together in so many churches of different lands, together also marked the advent of modern English hymns. Doddridge was a child when the hymns of Watts were published, and, having become much attached to them, derived from them, it may be supposed, something of the poetic and devotional feeling which is expressed in his own hymns, many of which have entered into the life of the evangelical churches. Charles Wesley, a few years younger than Doddridge, became intimately connected with his older brother in the labors of the Methodist itineracy, and, during intervals of toil, wrote 7,000 hymns, many of which are highly esteemed for their lyrical excellence, religious fervor, and varied Christian experience. They owe much of their success, also, to the influence of the great revival of religion, in the midst of which he labored and which they, in their turn, so largely promoted. Some of them are rendered more interesting by the peculiar circumstances

which suggested them. At the beginning of his Christian life, while shrinking back from a public profession of his faith, a friend said to him: "If you had a thousand tongues you should publish the gospel with them all." This led to the hymn, *Oh for a thousand tongues to sing.* Standing on the extreme projection of Land's End, he wrote, *Lo! on a narrow neck of land.* His judgment hymn was written just after the earthquake which destroyed Lisbon. Toplady, widely separated from the Wesleys in theological opinion, has been closely united with them in influence by his *Rock of Ages, cleft for me.* After these came Olivers, Cennick, Beddome, the countess of Blessington, and Annie Steele. The Olney hymns, by Newton and Cowper, contain among many other favorites, *Amazing grace, how sweet the sound; How sweet the name of Jesus sounds;* and *Sometimes a light surprises,* written by the former; and by the latter *Oh for a closer walk with God; There is a fountain filled with blood;* and *God moves in a mysterious way.* Robinson wrote *Come thou fount of every blessing;* Logan, *Where high the heavenly temple stands;* Medley, *Awake my soul in joyful lays;* Kirk White, *The Lord our God is full of might;* Perronet, *All hail the power of Jesus' name;* Thomas Moore, *Come, ye disconsolate.* James Montgomery, a Moravian Christian and a gifted poet, has enriched English hymnology with precious songs too numerous to be specified and too highly valued by the church at large to need commendation here. Lyte is the author of *Jesus! I my cross have taken;* Sarah F. Adams, of *Nearer my God to thee;* Charlotte Elliott, of *Just as I am without one plea;* sir John Bowring, of *In the cross of Christ I glory;* bishop Heber, of *From Greenland's icy mountains.* Keble's *Christian Year,* while it contains many hymns that are precious to all Christians, is said to have contributed greatly to the success of *Tracts for the Times.* "In its pensive, dreamy, soothing strains, we have the logic of the Oxford schools turned into rhetoric. The academic cloister and the Gothic aisle are the haunt and main region of his song. The white Levitical vestment is his singing robe, and you listen, in the dim religious light, to a music like the lulling chime of church bells." 4. *American.* The first American edition of Watts's Psalms and Hymns was published in 1741 by Benjamin Franklin, then a Philadelphia printer and comparatively unknown. These among Congregational, Baptist, and Presbyterian churches, with a collection of Wesley's hymns among Methodists, were, for many years, almost the only books in general use. In 1800 president Dwight, at the request of the general association (Congregational) of Connecticut, prepared an edition of Watts, with many additional hymns, some of which, from his own pen, are of great value. Among these are: *I love thy kingdom, Lord,* and *While life prolongs its precious light.* In 1818 Dr. Worcester of Salem, Mass., added to the unchanged Watts a copious selection of the best hymns then accessible. In 1830 Dr. Leavitt's *Christian Lyre* appeared; in 1831, *Church Psalmody,* by Dr. Lowell Mason and rev. David Green; in 1832, *Spiritual Songs,* by Drs. Mason and Hastings; in 1858, the Plymouth collection, by rev. Henry Ward Beecher, and the Sabbath Hymn Book, by profs. Park and Phelps, and Dr. Mason. By that time all the barriers had given way and new hymn books have since been introduced among all denominations. In these various collections, besides the productions of English authors already mentioned, there are many choice American hymns. Among these may be cited: *Softly now the light of day,* and *Rising out the banner, let it float,* by bishop Doane of New Jersey; *I would not live alway,* by Dr. Muhlenbergh; *How beauteous were the marks divine,* and *Oh! where are kings and empires now,* by bishop Coxe; *Oh sacred head, now wounded,* translated by Dr. James W. Alexander from Gerhardt's German hymn; *It is not death to die,* by Dr. Bethune; *My faith looks up to thee,* and *Jesus! these eyes have never seen,* by Dr. Ray Palmer; *Blest comforter divine,* by Mrs. Sigourney; *One sweetly, solemn thought,* by Phœbe Carey; *I love to steal awhile away,* by Mrs. Phœbe H. Brown. These and many more have greatly enlarged the list of psalms, hymns, and spiritual songs, in which the Christian church of all denominations can now worthily sing praises to the Lord. And, during all these years of advancement in hymns for the church, great attention, also, has been given to providing special hymns for children. The collections of these are very numerous and of various degrees of merit—few, however, of highest rank. Among the earliest was Bradbury's *Golden Chain,* and among the latest is Dr. Charles S. Robinson's *Spiritual Songs for Sabbath Schools.* In general, the public taste in hymnology is growing more critical, and demands are heard from various quarters for a disregarding of many of the hymns which have swollen recent hymn-books to such great proportions. It is claimed that good prose is better than poor poetry, and that when devotion calls art to its service it should secure at least sufficient art to produce correct rhyme and rhythm.

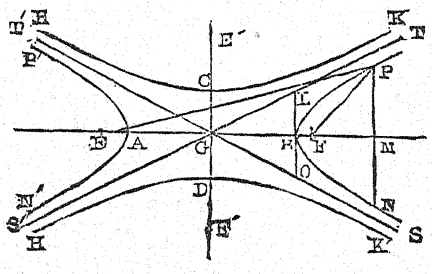
HYOID BONE, the tongue bone, or V-shaped bone, so named from its resemblance to the Greek letter *upsilon.* It is sometimes spoken of as unimportant in man, compared to the so-called hyoid bone in many of the lower animals, in which, on account of its being a support for branchial apparatus, it is often developed to a great size. But its importance is no less in man, because of its connection with the principal lingual organ; the perfection of its form and its exact location at the base of the tongue being a considerable element in the apparatus for the formation of articulate and musical sounds.

HYOSCY'AMUS. See HENBANE

HYPA'TIA, daughter of Theon, an astronomer and mathematician of Alexandria, and head of the Neo-Platonic school in that city, was b. in the latter part of the 4th century. She was equally remarkable for her beauty, her wisdom, and her tragic fate. From her earliest youth, she exhibited an amazing intelligence, in consequence of which, her father, one of the most erudite savants of his time, resolved to give her genius a thoroughly philosophic culture. She succeeded her father in the chair of philosophy at Alexandria; and the fame of her lectures drew round her students from all parts of the east where the influence of Greek thought and knowledge was felt. Hypatia seems to have been worthy of the lofty eulogies she has received. Amid the wide-spread corruptions of Alexandria she lived as spotless as a vestal; and if her teaching was not one that could lay a strong hand on the vices of heathenism, and arrest their course, it was at least sufficient not only to preserve herself from pollution, but also to inspire her with a love of beauty, truth, and goodness, that was Christian in its spirit and earnestness, in heathen in its form and limitations. The citizens of Alexandria were proud of her; and such reliance was placed on her judgment and sagacity, that the magistrates used frequently to consult her on important cases. Among those who were most intimate with her was Orestes, prefect of the city. At this time the bishop of Alexandria was Cyril (q.v.), a fierce hater of heathens and heretics. Detesting Orestes, whom he suspected of being no true Christian, and who had drawn up an accusation against him for exciting a tumult, he soon cast an evil eye on Hypatia, whom he regarded as a satanic enchantress, and the grand obstacle to his reconciliation with the prefect. His hatred communicated itself to the lower clergy, and especially to certain savage monks from the Nitrian deserts, who, headed by one Peter, a reader, attacked Hypatia in the streets as she was returning from her lecture-room. The maiden was dragged from her chariot, hurried to the Cæsarian church, where she was stripped naked, and murdered with tiles, after which she was torn to pieces, and her limbs carried to a place called Cinaron, and there burned to ashes, 415 A.D. Hypatia is the heroine of Charles Kingsley's *Hypatia, or New Foes with an Old Face.*

HYPERÆSTHE'SIA (derived from *hyper*, over, and *aisthēsis*, a sensation) include those affections which have this property in common—viz., an exalted irritability and increased irritation of the nerves. Hyperæsthesia of the cutaneous nerves is manifested by pain in its various modifications, which is sometimes intensely severe, as in tic-douloureux (q.v.), while hyperæsthesia of the nerves of special sense is manifested by phantasms, illusions, etc. The following points are common to the whole class of these affections: 1. Periodicity, or the alternations of paroxysms and intermissions; 2. Uniformity and persistence of the symptoms, however long the duration of the disease; 3. No danger to life; 4. Freedom from this class of diseases in early life. Of the diseases predisposing to hyperæsthesia, hysteria is far the most frequent; but it is sometimes induced by rheumatism, gout, skin-diseases, etc.

HYPER'BOLA. If two similar cones be placed apex to apex, and with the lines joining the apex and center of base in each, in a straight line; then if a plane which does not pass through the apex be made to cut both cones, each of the two sections will be a *hyperbola*, as PBN, P'AN'. It is, viewed analytically, the locus of the point to which the straight lines EP, FP differing by a constant quantity are drawn from two given points, E and F. These given points are called the *foci*, one being situated in each hyperbola. The point G, midway between the two foci, is called the *center*, and the line EF the *transverse axis* of the hyperbola. A line through G perpendicular to the transverse axis is called the *conjugate axis;* and a circle described from center B, with a radius equal to FG, will cut the conjugate axis in C and D. If G be taken for the origin of co-ordinates, and EM and E'F' for the axis, the hyperbola is expressed by the equation $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. (GB=$a$, GC=$b$). The hyperbola is the only conic section which has asymptotes (q.v.); in the figure these are GT, GT'; GS, GS'. It also appears that if the axis of co-ordinates be turned at right angles to their former position, two additional curves, HCK, H'DK', will be formed, whose equation is $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$. These two are called *conjugate hyberbolas*, and have the same asymptotes as the original hyperbolas. These asymptotes have the following remarkable property: If (starting from G) the asymptotes be divided in continued proportion, and from the points of section lines be drawn parallel to the other asymptote, the areas contained by two adjacent parallels and the corresponding parts of the asymptote and curve are equal; also lines drawn from the center to two adjacent points of section of the curve, inclose equal areas. The equation to the hyperbola when referred to the asymptotes is



$xy=ab$; which shows that as the ordinates decrease in geometrical progression, the abscissæ increase in the same ratio.

HYPER'BOLÉ (Gr. *hyper*, over, and *ballein*, to throw) is the name given to a figure of rhetoric, by which expressions are employed that, taken literally, signify more than is really meant. The use of the figure is to arrest the attention. Hyperbole is the basis of many metaphors. Thus, we call Nero a "monster;" Tamerlane, a "tiger;" and so on.

HYPERBO'REANS (that is, dwellers beyond Boreas or the North Wind), a name given by the ancients to all the unknown peoples of the west and north. The Greeks imagined the country n. of the Rhipæan (generally supposed to be the Ural) mountains to be inhabited by the Hyperboreans, and their residence was gradually referred to more distant regions; but it was universally supposed that, as the favorites of Apollo, they enjoyed a terrestrial paradise, a bright sky, and a perpetual spring, a fruitful land, and everlasting youth and health.

HYPERICA'CEÆ, or HYPERICI'NÆ, a natural order of exogenous plants, containing about 300 known species, trees, shrubs, and herbaceous plants, widely distributed over the world, and in very different climates, but particularly numerous in North America. The leaves are generally covered with pellucid dots, and the edges of the leaves, sepals, and petals bordered with black glands. The stamens are united at the base, and grouped in from 3 to 5 bundles.—The species of *vismia* yield a substance resembling gamboge. Many of the hypericaceæ belong to the genus *hypericum*, or St. John's wort, of which some species are common natives of Britain, adorning woods, heaths, etc., with their bright yellow flowers. *H. calycinum*, a spreading shrubby species, naturalized in some places in Britain, has flowers more than 2 in. in diameter. *H. perforatum*, the common or true St. John's wort, has astringent properties, and is used for gargles and lotions, and internally in dysentery, etc., although not recognized in the pharmacopœia. Superstitious notions are connected with it in many parts of Europe, particularly when gathered on the day of St. John the Baptist.—*H. androsæmum* (or *androsæmum officinale*), commonly called tutsan, a pretty common native of Britain, with berry-like fruit, was once in great esteem as a vulnerary. Its English name is *tutsan*, from the French *tout saint*, all whole.

HYPERI'DES, an Athenian orator, one of the ten comprised in the Alexandrian canon; the contemporary of Demosthenes. After studying philosophy under Plato, and oratory under Isocrates, he began his public career as an advocate in the Athenian courts of justice, and joined the patriotic party, at that time led by Demosthenes and Lycurgus. He fitted out two triremes at his own expense for the Eubœan expedition of B.C. 358. His whole public life, for the next 20 years, was spent in devising means of resistance to the growing power of Macedonia. In 338 B.C., when the disastrous fight of Chæronea laid Greece at the mercy of Philip, Hyperides proposed that the citizens should send their wives and children to places of security, and fight it out to the last. Though this desperate advice was not taken, its genuine patriotism was appreciated and rewarded by his countrymen. When the death of Philip revived the hopes of the anti-Macedonian faction, Hyperides promoted the alliance with Thebes; and after the destruction of that city by Alexander, was one of the orators demanded of the Athenians by the young victor. Alexander, however, did not press his demand, and Hyperides continued to oppose the Macedonian influence as strongly as ever. The arrival in Athens of Harpalus, the run-away treasurer of Alexander, then absent on his eastern conquests, disturbed the friendly relation that had hitherto subsisted between Hyperides and Demosthenes. Harpalus had embezzled 5,000 talents of the public money, with which he endeavored to organize a party for himself among the Athenians. It was believed that, among others, Demosthenes had yielded to his bribes and specious stories, and Hyperides was selected to prosecute his ancient friend. This led to a rupture, which was not healed for some time. In the Lamian war, which followed the death of Alexander, Hyperides took a leading part; and when it was brought to a close, spoke the funeral oration over his countrymen who had perished in battle. This oration was looked upon as a masterpiece by the ancients. The following year (B.C. 322) saw the hopes of Athens finally crushed at the battle of Crannon. The chiefs of the patriotic party sought safety in flight. Hyperides was overtaken at Ægina by the minions of Antipater, and put to death. Seventy-five orations were attributed to Hyperides; but a third of these were rejected as spurious by the ancients themselves. Westermann has preserved the titles of sixty-one of these in his *History of Greek Oratory*.

HYPE'RION. See TITANS.

HY'PERSTHENE, a mineral closely related to augite and diallage. It is a bisilicate of iron and magnesia. It is crystalline, but often found granular or disseminated. Viewed in one direction, with reference to its cleavage planes, it is copper-colored, in another it is dark brown. When cut and polished, it is cherry-red, with a pearly luster, and is valued for rings, brooches, etc. The finest specimens are brought from the coast of Labrador, although it is found in Norway, Sweden, Germany, Scotland, etc. It is sometimes found in connection with feldspar, forming *hypersthene rock*, a rare kind of trap rock.

HYPER'TROPHY (Gr. over-nourishment) is the term applied in medicine to the enlargement of certain organs of the body. The best examples of this change are seen in the muscular system, where it may occur altogether independently of disease. The hugh bosses of flesh that stand prominently forward in the arm of a blacksmith or of a pugilist, and in the leg of an opera-dancer, are illustrations of hypertrophy, where the general health may be perfect. In double organs, such as the kidneys and lungs, if the organ on one side degenerates through disease, the organ on the opposite side is often found to enlarge, and carry on double work. In these cases, hypertrophy is an effect of disease, but is at the same time a resource of nature to preserve life.

There are, however, cases in which the hypertrophy has a hurtful instead of a conservative effect, as, for example, hypertrophy of the thyroid gland, constituting the disease known as goitre or bronchocele, hypertrophy of the prostate gland, of the spleen, etc. The following are, according to Mr. Paget, the conditions which give rise to hypertrophy: 1. The increased exercise of a part in its healthy function; 2. An increased accumulation, in the blood, of the particular materials which a part appropriates in its nutrition or in secretion; 3. An increased afflux of healthy blood. In hypertrophy of the muscular tissue, the first and third of these conditions are present. In hypertrophy of the fatty tissue, constituting obesity, there is an excess of fat or its chief elements in the blood.

HY'PHASIS. See SUTLEJ.

HY'PHEN (Gr. together, in one), the name given to a mark in writing, thus (-), indicating that two words or syllables are to be connected; e.g., bull-fight.

HYP'NOTISM (from the Greek word *hypnos*, sleep) is a term invented by the late Mr. Braid, of Manchester, to designate certain phenomena of the nervous system which in many respects resemble those which are induced by animal magnetism, but which clearly arise from the physical and psychical condition of the patient, and not from any emanation proceeding from others. The following are his directions for inducing the phenomena, and especially the peculiar sleep-like condition of hypnotism. Take a silver lancet-case or other bright object, and hold it between the fingers of the left hand, about a foot from the eyes of the person experimented on, in such a position above the forehead as to produce the greatest strain on the eyes compatible with a steady fixed stare at the object. The patient must be directed to rivet his mind on the object at which he is gazing. His pupils will first contract, but soon dilate considerably; and if, after they are well dilated, the first and second fingers of the operator's right hand, extended and a little separated, are carried from the object towards the eyes, the eyelids will most probably close with a vibratory motion. After 10 or 15 seconds have elapsed, it will be found that the patient retains his arms and legs in any position in which the operator places them. It will also be found that all the special senses, excepting sight, are at first extremely exalted, as also are the muscular sense and the sensibility of heat and cold; but after a time the exaltation of function is followed by a state of depression far greater than the torpor of natural sleep. The patient is now thoroughly hypnotized. The rigidity of the muscles and the profound torpor of the nervous system may be instantly removed and an opposite condition induced by directing a current of air against the muscles which we wish to render limber, or the organ we wish to excite to action; and then by mere repose the senses will speedily regain their original condition. If a current of air directed against the face is not sufficient to arouse the patient, pressure and friction should be applied to the eyelids, and the arm or leg sharply struck with the open hand.

From the careful analysis of a large number of experiments, Mr. Braid is led to the conclusion that by a continual fixation of the mental and visual eye upon an object, with absolute repose of body and general quietude, a feeling of stupor supervenes, which renders the patient liable to be readily affected in the manner already described. As the experiment succeeds with the blind, he considers that "it is not so much the optic, as the sentient, motor, and sympathetic nerves, and the mind, through which the impression is made."

Many of the minor operations of surgery have been performed on patients in the hypnotized state without pain, and hypnotism has been successfully employed as a therapeutic agent in numerous forms of disease, especially such as have their seat in the nervous system. An interesting memoir *On Hypnotic Therapeutics* was published by Mr. Braid in the 17th volume of *The Monthly Journal of Medical Science* (1853).

HYP'NUM, a genus of mosses, which contains many of the most common British species, growing on moist ground, in woods, on old trees, etc. Many species have stems of considerable length and much branched. The fruit-stalk springs from a lateral tubercle. The *peristome* (see MOSSES) is double, the exterior of 16 teeth, the interior a membrane divided into 16 segments, with alternate cilia.

HYP'OCAUST, a form of furnace much used by the Romans, for the purpose of heating baths and apartments. The fuel is placed in a chamber under the floor, and the smoke and heated air are made to circulate round the walls and under the floor, by means of hollow tubes, or a hollow lining. The full benefit of the fire is thus obtained, in place of a large portion of the heat being allowed to escape, as it does, in the case of

an open fireplace, up the chimney. The Romans invariably used this form of furnace for heating their dwelling-houses, and in all the Roman houses which have been discovered in this country, remains have been found of the hypocaust. It is now coming again into use for heating the so-called "turkish baths."

HYPOCHÆ'RIS, a genus of plants of the natural order *compositæ*, sub-order *cichoraceæ*, of which one species, *H. radicata*, or long-rooted cat's-ear, is extremely common in meadows and pastures in Britain. Its leaves are all radical, and spread on the ground, resembling in form those of the dandelion, but rough; the stem is branched, the flowers not unlike those of the dandelion, but smaller. Cattle eat this plant readily, and its abundance is not deemed injurious to pasture or fodder.

HYPOCHLO'ROUS ACID (ClO) is a dark red fluid, which, at a temperature of about 70°, becomes converted into an orange-colored gas, which very readily explodes into its ultimate constituents. A watery solution of this gas has a penetrating, chlorine-like odor, a caustic action on the tongue, colors the skin brown, and if applied for any length of time, causes it to ulcerate. It is the active ingredient of the different bleaching-powders and salts. Its salts—the hypochlorites—present very much the same odor as the acid. Their solutions bleach organic pigments, such as litmus and indigo, and are employed largely as bleaching agents

HYPOCHON'DERS (Gr. *hypo*, under; *chondros*, a cartilage) are the two lateral and superior regions of the abdomen (q.v.) under the cartilages of the false ribs, and to the right and left of the epigastrium.

HYPOCHONDRI'ASIS (so called from its supposed connection with the hypochondriac regions of the abdomen), a disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate the greater part of diseases, exaggerated uneasiness and anxiety, chiefly in what concerns the health, etc. In extreme cases it becomes a species of insanity (see below). The disease is intimately connected with, if not caused by, disorder of the digestive functions. See INDIGESTION.

Hypochondriacal Insanity.—When somberness of disposition and anxiety concerning personal comfort become exaggerated, and attention is directed chiefly to the state of the health, it amounts to common hypochondriasis. When it passes beyond the control of the will, when the whole mind is directed to the state of the system, or to particular organs, and exalts and misinterprets sensations, the condition is designated hypochondriacal insanity. The disease may be described as the engrossment of the attention by false impressions conveyed, or conceived to be conveyed, from internal organs. These sensations may, in many instances, be real, and proceed from actual alterations in the structure or functions of the parts supposed to be affected; but they may likewise consist of ordinary sensations, excited and intensified by the act of attention which makes them known to the patient. Neither the experience nor the sufferings of the victims are imaginary, however absurd their errors, and however groundless their apprehensions may be; the disease consists in the exaltation of sensibility and attention, and in the delusions which originate in that morbid state. A man lives in constant fear of death; he is firmly convinced that he labors under cancer, consumption, disease of the heart, and lives upon drugs; that his stomach, or bowels, are contracted, or the abode of frogs, a fetus, or an army of soldiers; that his legs are transformed into glass or ice; that his whole body has assumed the shape of a teapot, or the magnitude of a hippopotamus. It is often a precursor of melancholia, as in the case of Cowper the poet, and other kinds of alienation; but it must likewise be regarded as a distinct and independent affection, traceable, generally, to dyspepsia, or disorder of the digestive and assimilative apparatus. It is probable that shades and degrees of this malady may constitute those links which connect partially healthy from absolutely unsound minds. In females, there are often added to the phenomena already described many of the symptoms of hysteria and great impressionability, and even convulsive affections; there is likewise encountered the simulation of diseases, the tendency to deceive others after having deceived themselves into the belief that they are invalids, and laboring under grievous and incurable disorders. They crave sympathy and support, as subject to affections of the spine, the joints, the lungs. They abstain from food, or devour inedible and disgusting substances; they writhe in what appears excruciating pain, and they voluntarily sustain great suffering during the treatment of their fancied ailments. A patient of Dr. Page, Carlisle, underwent amputation of the finger, wrist, forearm, and ultimately of the arm, in order to be relieved of sores which she produced. Certain of the maladies which are pretended, or feared, or fancied, appear to be called into existence under the morbid influence of volition: and there are strong grounds for believing that the concentration of attention upon a particular function, not merely interferes with its exercise, but disturbs the physical condition, and leads to degeneration of the tissue of the organ with which it is connected by capillary congestion, or evolution of nerve-force.—Falret, *De l'Hypochondrie et du Suicide* (1822); Andrew Combe, On Hypochondriasis, *Phrenological Journal*, vol. iii. p. 51; Cheyne, *The English Malady* (1733); Arnold, *Observations on Nature, Kinds, etc., of Insanity* (1782).

HYPODERMIC INJECTIONS, medicines introduced with a syringe beneath the skin. This method is often preferable to that of giving them by the mouth. The

stomach is sometimes in a condition which will not bear the presence of drugs, particularly narcotics, and these are the agents which are most frequently administered hypodermically. A small graduated glass syringe armed with a silver point, cut off obliquely so that its sharpened extremity may easily be made to pierce the skin, is used. The medicine may be thrown in just beneath the skin, but the point of the syringe is often thrust into the body of a muscle. The wounding of blood-vessels or nerves should be carefully avoided, and therefore the operation should never be undertaken except by a physician or an anatomist. Local pains may generally be more successfully treated in this manner than by the common method. In some cases an anæsthetic may, however, be preferable. It is usual to make a special preparation of the drug which is to be introduced. Morphia may be given in the form of sulphate, but some physicians prepare an acetate, according to directions given in the dispensatories. The syringe must be completely filled when used, otherwise the introduction of an air-bubble into a vein might be attended by danger, and if only thrown into the cellular tissue may cause inflammation and abscess. Other medicines than opiates are sometimes used, but they should all be used with caution. Habitual narcotization by means of hypodermic injections is as productive of a habit of opium taking as swallowing it, and physicians are often meeting with patients who will complain of pain at every visit, and beg for the use of the syringe.

HYP'OGENE (Gr. *formed beneath*), a geological term proposed by Lyell as a substitute for what is often called primary. He considered the latter term often inappropriate, because many granites are evidently of more recent formation than some secondary rocks. See GEOLOGY.

HYPOPHOS'PHITES, salts of hypophosphorous acid. The term is generally used in reference to certain medicinal salts. These are chiefly the hypophosphites of soda, potash, lime, ammonia, and iron, and more recently that of quinia, although this latter has not gained admittance into the pharmacopœias. The first four were proposed as specifics for pulmonary consumption, but although they have been used with some advantage in this disease, and in affections of the blood and of the digestive organs, they have failed to cure consumption. The hypophosphites of soda and lime are sometimes used in cases of debility, especially that depending upon prolonged lactation, but they need to be supplemented by ferruginous and other tonics.

HYPOSUL'PHITES, salts of hyposulphurous acid with bases. The most important are the hyposulphites of sodium, calcium, and sodium and silver. The last named double salt has recently been used as a topical application in place of nitrate of silver, than which it is more mild in its action. The hyposulphite of calcium has recently been used as a substitute for the sodium salt, or in similar diseases; but the latter substance, the hyposulphite of sodium, is the salt best known of all, and is used in the arts as well as in medicine. Among other methods, it may be prepared by digesting a solution of sulphite of sodium with flowers of sulphur, at a temperature somewhat below ebullition. When carefully prepared, it exists in large colorless crystals, having a mild, saline, sulphurous taste, very soluble in water, but insoluble in alcohol. It has the property of dissolving the chloride, bromide, and iodide of silver, and is used by photographers to dissolve away the silver compound which remains undecomposed upon the plate after its exposure in the camera. It is also used in chemical analysis to separate baryta from strontia in solutions of their salts. There are some very delicate tests for this salt; one of the most delicate is iodide of starch. The blue color which is produced by the suspension of almost infinitesimal quantities of this compound, is discharged by the addition of merely a trace of hyposulphite of sodium. Another test, recently discovered by Mr. M. Carey Lea, is ruthenium: an ammoniated solution of a salt of this metal, when boiled with hyposulphite of soda, turns to a rose-color, and then to a very rich carmine, which in strong solutions becomes almost black. The strong solution diluted produces various shades of color, rivaling aniline. In consequence of the power possessed by hyposulphite of sodium of destroying ferment organisms, it has been used as a remedy in zymotic diseases at the suggestion of Dr. Polli, of Milan; and reports from various quarters are that its use has been successful. Dr. Baxter, of Moscow, Iowa, reports having employed it in more than 100 cases of intermittent and remittent fever, without one failure. Dr. Corwin, U.S.N., in the treatment of small-pox on ship at Yokohama, reports its use with good results. The dose is from 10 to 20 grains three times a day, dissolved in a few ounces of water. It may be used as a lotion in skin-diseases in the proportion of a dram to a fluid ounce of water. See SULPHUR.

HYPOS'TASIS (Gr. *hypostasis*, subsistence), the term employed by Greek theological writers to designate the distinct subsistence of the three persons of the Trinity. Originally, the meaning of the word was unsettled. It was used by the fathers of the council of Nice, in the sense of *ousia*, essence or substance, and this confusion of phraseology supplied the most formidable weapon to the semi-Arians in the memorable Homoousian (q.v.) controversy. The use of the word hypostasis, however, was settled at a synod held by Athanasius in 357, in which it was fully distinguished from *ousia*, and explained as synonymous with *prosopon*, which the Latins rendered by *persona*, person. From this time, the word was adopted into the theological language of the Latin church, in which it is used indiscriminately with *persona*.

HYPOSTAT'IC UNION (Gr. *hypostasis*, person), a union of natures or substances so intimate as to constitute one undivided person. The term is used to describe the mysterious union of the divine and human natures in Christ, in virtue whereof, while each nature is complete, even after union, yet each merges its separate personality in the undivided person of the God-man, to which all the actions, whether divine or human, are ascribed. This form of expression was devised for the purpose of excluding the doctrine of a mere moral union held by Nestorius. See MONOPHYSITES, NESTORIANS, TRINITY.

HYPOT'ENUSE, or HYPOTH'ENUSE, the name of that side in a right-angled triangle which is opposite to the right angle. The well-known property of the hypotenuse, that the square described on it is equal to the sum of the squares described on the other two sides, is proved in the famous 47th proposition of the first book of Euclid's *Elements*, and has, in the sixth book, been generalized into the following form: The figure described on the hypotenuse is equal to the similar figures described on the other two sides. It is said that the 47th proposition was discovered by Pythagoras, who was so overjoyed at his good fortune that he sacrificed a hecatomb to the Muses. Camerer, in his edition of Euclid, gives seventeen different demonstrations of this proposition.

HY'POTHEC, a term in the law of Scotland, but not used in England, to denote a lien or security over goods in respect of a debt due by the owner of the goods. Thus, a landlord has a hypothec over the furniture or crops of his tenant in respect of the current rent; so a law-agent or attorney has a hypothec over the title-deeds of his client in respect of his account or bill of costs. In England these rights are called liens, and are not so liberally allowed. See Paterson's *Comp. of E. and S. Law*, s. 594. There is also a hypothec in favor of seamen over the freight in respect of their wages.

HYPOTHECA'TION is the pawning of a ship for necessaries, or to raise money in some critical emergency.

HYPOTHECA'TION indicates the right which a creditor has over something belonging to another, by which he may cause it to be sold to pay his claims. Conventional hypothecation is by agreement of the parties. General hypothecation implies about the same as an assignment for the benefit of creditors. Legal or tacit hypothecation is made without agreement between the parties. The public treasury has a lien on the property of public debtors, a landlord a lien on goods leased, and so mechanic's liens may be considered a form of hypothecation.

HYPOTH'ESIS. In endeavoring to explain natural phenomena, we have often to assume or imagine a cause, which, in the first instance, we do not know to be the real cause, but which may be established as such when we find that its consequences agree with the phenomenon to be explained. Every genuine theory was at one stage a mere conjecture, and became a true theory in consequence of being proved or verified by the proper methods. Thus, when it occurred to Newton that the force of gravity on the earth, as exemplified in falling bodies, might extend to the distance of the moon, and might be the power that compelled it to circle round the earth, instead of going off in a straight line through space, the suggestion was only an hypothesis, until such time as he was able to show that it accounted exactly for the facts, and then it became a theory.

A difference of opinion has arisen as to what constitutes a legitimate hypothesis, there being manifestly some necessary limits to the process of imagining possible causes. The case that has chiefly contributed to make this a question is the celebrated undulatory theory of light, a theory, or hypothesis rather, remarkable not only for the extent to which it explains the facts, but for having led to the discovery of new facts by way of inference from the theory itself. Notwithstanding all this amount of coincidence, the ethereal substance whose undulations are supposed to constitute light in its passage from the sun to the earth, is not known to have a real existence. It is an imaginary element, so happily conceived as to express with fidelity a series of extremely complicated phenomena. This was not the character of Newton's hypothesis as to the motion of the moon; the power supposed by him (the earth's gravity) was an actual or existing force, and all he did was to suggest that it extended as far as the moon. Accordingly, M. Auguste Comte and Mr. J. S. Mill have laid it down as the condition of a sound scientific hypothesis that the cause assigned to the phenomenon in question should be either a real cause, or capable of being ascertained to be a real cause, and that the liberty given to the scientific inquirer should be confined to imagining its operation in a particular sphere, and the law and amount of its operation, since both these could be verified by experiment and calculation. On the other hand, Dr. Whewell has contended that an amount of agreement with observed facts, such as has been exemplified by the undulatory hypothesis, is sufficient to establish not merely an hypothesis, but a theory, at least until such a time as some discordant facts arise, when the theory must be modified or abandoned. But whatever name be given to this class of suppositions, it is evident that they must be deemed inferior in scientific value to the other class of suppositions, where no cause or agent is assumed but what is actually known to exist, and where the only question is the presence of that agent in such manner and amount as to tally with the observed facts. Gravity, heat, electricity, magnetism, are established natural agents, and when we assume any one of these as the cause of some phenomena, we are on safe

ground so far, that if it be once shown that they are actually operative in the case we are dealing with, and that their calculated effect exactly coincides with the observed effect, the explanation is complete and final; no subsequent discovery can disturb a conclusion established in this way. But if we have to assume the very agency itself, or to imagine a power that we have no experience of, the coincidence between the laws of the assumed agency and the laws of the phenomena produces at best but a temporary or provisional evidence, which is liable to be superseded whenever a still better imagined machinery shall be brought forward. Thus, in the case of light, the first hypothesis, that of Newton himself, was a stream or shower of corpuscles; this gave way to the undulatory ether, whose merit lay in embracing the facts more closely; but we have no security against the ultimate preference of some third supposition which shall displace the second, as that did the first; while, perhaps, a day may come when an agency shall be proved to exist capable of explaining the phenomena. Even granting that we must sometimes assume an unknown agent (when an effect seems to be beyond the power of all the recognized forces), yet, in ordinary researches, it is considered a grave objection if the assumed agent be of such a subtle or occult nature, or so far removed from observation, that its existence does not admit of being proved. Such was the doctrine of the Cartesian vortices, and such are any hypotheses as to the shapes, sizes, and distances of the ultimate atoms of matter. Such also is the doctrine of nervous fluids, whereby the impulses of mind are supposed to be propagated between the brain and the other parts of the body.

HYPOXAN'THINE, a substance found in the spleen and muscles of the heart of man, and in the spleen and blood of the ox. It is a white crystalline powder, almost insoluble in cold hydrochloric acid, very slightly soluble in boiling alcohol, and requiring for solution in water 1090 equivalents of cold, or 180 of boiling water. Its solution has a neutral reaction.

HYPSILANTIS. See YPSILANTI.

HYPSOM'ETRY. See HEIGHTS, MEASUREMENT OF, *ante.*

HYRA'CEUM, a peculiar substance found in the crevices of the rocks of Table mountain, cape of Good Hope. It is one or more of the excrements of the cape Hyrax (*Hyrax capensis*). Hyraceum is a blackish-brown viscid material, not unlike soft pitch, having a strong and offensive taste, not unlike castoreum, for which it has been used as a substitute in medicine. At one time, so large a quantity was found as to suggest the idea of its being used as a manure, but the supply was soon exhausted, and only a small quantity is now imported to meet the demand of the curious pharmaceutist.

HYRACOTHE'RIUM, a genus of fossil pachydermata, belonging to the division perrysodactyla, the animals of which are characterized by having an odd number of toes. The genus was founded by Owen on the fragmentary remains of two species found in lower eocene strata; a third species from the same beds has been since described by him from more complete materials, under the name *pliolophus vulpiceps;* he considers it only a subgenus, and as we can see no characteristics to separate it generically from the other two, we place it here as a true hyracothere. The fossil was discovered in a nodule from the Roman cement bed of the London clay near Harwich. It is the most complete eocene mammalian fossil of the London clay. It consists of an entire skull and a portion of the rest of the skeleton, including the right humerus and femur, a great part of the left femur, the left tibia, and three metatarsal bones, apparently of the same foot, besides fragments of pelvis, ribs, and vertebræ. The head is 5 in. long, and 2 in. 2 lines broad; it is slender, tapering gradually from the zygomatic region to the muzzle; the upper outline is straight; the bony rim of the orbit is incomplete behind for about one-fifth of its circumference. The narrow skull and incomplete orbit ally it to the paleothere; the same form of orbit occurs also in the rhinoceros, and more exactly in the tapir. The straight contour of the skull, and the structure of the nasal aperture, show affinities with the horse and hyrax. The third molar of the upper jaw shows the structure of the teeth. The teeth, as well as the form of the lower jaw, tell plainly of the herbivorous character of the hyracothere. The bones of the leg exhibit ungulate affinities, and their form and proportions are between those of the hyrax and the tapir. The second species was founded on a mutilated cranium, rather larger than a hare's, found in the cliffs of London clay near Herne bay. It shows a skull very like the first species, though broader at the orbital region. The third molar tooth has a larger number of cones than the same tooth in the first species. The third species was founded on several teeth which belonged to a smaller animal than either of the others, found in the eocene sand underlying the Red Crag at Kyson, in Suffolk. The molar exhibits a structure similar to that of the others. From the same deposit were obtained two teeth belonging to a lower jaw, one of them, the third molar, still in its socket, and having a fragment of the jaw attached to it. These teeth were considered by Owen to belong to a quadrumanous animal, and were described by him as *macacus eocænus*, "at once the first terrestrial mammal which has been found in the London clay, and the first quadrumanous animal hitherto discovered in any country in tertiary strata so old as the eocene period." Since its publication, speculative geologists have made good service of this "monkey." Owen has, however, since stated (*Ann. Nat. Hist.*, Sept., 1862), that the two teeth belong to the third species of hyracothere.

HYRAX. See DAMAN.

HYRCA'NIA, an ancient district of Asia, bounded on the n. by the Caspian sea (sometimes called *Hyrcanum Mare*) and the Ochus river, on the e. and s. by the Sariphi mountains (now Elburz), which separated it from Parthia, and on the w. by Media. It corresponds with the modern Mazanderán and Asterabad. With the exception of the coast districts, and the valleys among the hills, which produced corn, oil, and wine, it was not a fertile region; dense forest prevailed, through which roamed multitudes of savage animals, the Hyrcanian tiger in particular being celebrated. The inhabitants were of the same stem as the Parthians, and were noted for their wild and rude character.

HYRCA'NUS, the name of two Jewish high-priests and princes of the Asmonean family.—1. JOANNES HYRCANUS, son of Simon Maccabeus, who ruled 136 to 106 B.C., was at first tributary to the Syrians; but on the death of Antiochus, made himself independent, subdued the Samaritans on the n., and forced the Idumæans on the s. to adopt the laws and customs of the Jews. He also concluded an alliance with the Romans, or rather confirmed that which his father Simon had previously made; built the strong fortress of Baris on the north-eastern angle of mount Moriah, and extended his territories almost to the ancient limits of the Davidian monarchy. He is also supposed to have founded the Sanhedrim (q.v.). Originally a Pharisee, he subsequently attached himself to the party of the Sadducees, who were anxious to keep on good terms with the Romans, and who discountenanced the turbulent religious patriotism of the Jewish masses. Hyrcanus was, comparatively speaking, a just and enlightened ruler, and the country enjoyed great prosperity during his reign. He left five sons, two of whom, Aristobulus and Alexander, governed with the title of king.—2. HYRCANUS II., son of Alexander, and grandson of the preceding, was a feeble prince. On the death of his father (78 B.C.), he was appointed high-priest by his mother, Alexandra, who ruled Judæa herself for the next nine years. After her death (69 B.C.), his younger brother, Aristobulus, a braver and more energetic man, seized the government, and forced Hyrcanus to withdraw into private life. Induced by the Idumæan, Antipater, and aided by Aretas, king of Arabia Petræa, he endeavored to win back his dominions, but was not successful until Pompey began to favor his cause. After some years of tumultuous fighting, Aristobulus was poisoned by the partisans of Ptolemy (49 B.C.), and Hyrcanus, who had for some time possessed, if he had not enjoyed, the dignity of high-priest and ethnarch, was now deprived of the latter of these offices, for which, in truth, he was wholly incompetent. Cæsar (47 B.C.), on account of the services rendered to him by Antipater, made the latter procurator of Judæa, and thus left in his hands all the real power, Hyrcanus busying himself only with the affairs of the priesthood and temple. Troubles, however, were in store for him. Antipater was assassinated, and Antigonus, son of Aristobulus, with the help of the Parthian king Orodes I., invaded the land, captured Hyrcanus by treachery, cut off his ears, and thus disqualified him for the office of high-priest, and carried him off to Seleucia on the Tigris. Some years later Herod, son of his old friend Antipater, obtained supreme power in Judæa, and invited the aged Hyrcanus home to Jerusalem. He was allowed to depart, and for some time lived in ease and comfort, but falling under suspicion of intriguing against Herod, was put to death (30 B.C.).

HYRTL, JOSEPH, a distinguished anatomist, was b. in 1811 at Eisenstadt, in Hungary, studied at Vienna, and early acquired eminence both as a scientific anatomist, and upon account of the extreme beauty of his anatomical preparations. He became professor of anatomy in Prague in 1837, and at Vienna in 1845. Whilst yet a student he enriched the anatomical museum of Vienna with many preparations. He has contributed not a little to the progress of comparative anatomy, especially that of fishes, and has made the anatomy of the ear a subject of very particular investigation. He has written many books and articles on the subjects above indicated, of which the two principal are *Lehrbuch der Anatomie des Menschen* (1847; 13th edit. 1875), and *Handbuch der Topographischen Anatomie* (1847; 6th edit. 1871). The former is a text-book in all German universities and has been translated into various languages. Hyrtl formed a museum of comparative anatomy at Vienna, and became rector of the university there, resigning office in 1874.

HYSSOP, *Hyssopus,* a genus of plants of the natural order *labiatæ,* distinguished by four strong diverging stamens, and a calyx with 15 ribs. The known species are few. The common hyssop (*H. officinalis*) is a native of the s. of Europe and the east. It is found on the Alps of Austria. It is a half-shrubby plant, about 1½ ft. high, the upper part of the stems quadrangular, leaves evergreen and lanceolate, the flowers in one-sided whorled racemes. The flowers are generally of a very beautiful blue. It has an agreeable aromatic odor. It has long been in cultivation for the sake of its leaves and young shoots, which are sometimes used for culinary purposes as a seasoning, but more generally in a dried state as a stomachic and carminative. A syrup made with them is a popular remedy for colds. The virtues of hyssop depend on a volatile oil.—It is very doubtful what plant is the hyssop of the Bible. It has been supposed to be some species of *phytolacca* (q.v.), as *P. acinosa,* a native of the Himalayas; but of late strong arguments have been advanced in favor of the common caper (q.v.).—HEDGE HYSSOP is *gratiola officinalis.* See GRATIOLA.

HYSTAS'PES, supposed to be the author of a work containing predictions of Christ and the future of his kingdom. Of his life nothing is known, and the book itself has disappeared. It is known only by mention made of it in later writers. It seems to have been a post-prophetic announcement of the coming and kingdom of the Savior.

HYSTE'RIA (so called from the Greek word *hystera*, the womb) is a disease which simulates so many other diseases, that it is not easy to describe it with the brevity which the limits of this work necessitate.

The hysterical fit or paroxysm—the most marked form or manifestation of the disorder—is almost, though not exclusively, confined to women, and chiefly to young women. In a severe case, the trunk and limbs are strongly convulsed; the patient struggles violently, retracting and extending her legs, and twisting her body with such force that the aid of three or four strong persons is often required to prevent a slight and apparently feeble girl from injuring herself or others. "The head," says Dr. Watson in his lectures, "is generally thrown backwards, and the throat projects; the face is flushed; the eyelids are closed and tremulous; the nostrils distended; the jaws often firmly shut; but there is no distortion of the countenance. If the hands are left at liberty, she will often strike her breast repeatedly and quickly, or carry her fingers to her throat, as if to remove some oppression there; or she will sometimes tear her hair, or rend her clothes, or attempt to bite those about her. After a short time this violent agitation is calmed; but the patient lies panting, and trembling, and starting at the slightest noise or the gentlest touch; or sometimes she remains motionless during the remission, with a fixed eye; till all at once the convulsive movements are renewed; and this alternation of spasm and quiet will go on for a space of time that varies considerably in different cases; and the whole attack frequently terminates in an explosion of tears, and sobs, and convulsive laughter.

In another less frequent form of the affection, the patient suddenly sinks down insensible and without convulsions; after remaining for some time in this state, with flushed cheeks, a turgid neck, and irregular breathing, she recovers consciousness, but remains for some time depressed in spirits and fatigued.

During the attack, especially in the first variety, the patient complains of uneasiness in the abdomen, and of a sensation as if a ball were rolling about, and rising first to the region of the stomach, and then to the throat, where she feels as if she were being choked. The abdomen is distended with wind, which moves with a loud rumbling sound along the intestinal canal, and is often discharged by eructation. Towards the close of the fit, but more commonly after it is over, a large quantity of pale limpid urine is discharged.

In many respects, this affection resembles epilepsy (q.v.). According to Dr. Marshall Hall, the most essential difference is this: that in hysteria, much as the larynx may be affected, it *is never* closed; while in epilepsy, it *is* closed. Hence, in the former we have heaving, sighing inspiration; and in the latter, violent, ineffectual efforts at expiration.

The hysterical fit varies in duration from a quarter of an hour or less to many hours.

The persons who suffer from hysteria are commonly young women in whom the process of menstruation is disordered, and who are either naturally feeble, or have been debilitated by disease or want; and in patients of this kind, the hysteria, or the hysterical tendency, is apt to show itself in mimicking so faithfully many of the most important diseases, that the physician has often great difficulty in determining the true nature of the case. Among the disorders that may be thus simulated by hysteria are, inflammation of the peritoneum (or peritonitis, q.v.), various forms of palsy, inflammation of the larynx (or laryngitis, q.v.), inability to swallow (or dysphagia), painful affection of the breast, disease of the hip and knee joints, and disease of the spine. Many of these cases of pseudo disease come to a sudden favorable termination under some strong mental or moral emotions. Those who are old enough to recollect the morbid religious excitement that prevailed at the time when Irving and his followers believed in the "unknown tongues," can hardly fail to remember the remarkable, or, as many regarded it, the miraculous cure of a young paralytic lady, who was made to believe that if, on a certain day, she prayed for recovery with sufficient faith, her prayer would be answered, and she would recover at once. She did so, and her palsy instantly disappeared. This case which was regarded by the believers in the movement as a direct answer to prayer, and as inaugurating a new era of miraculous cures, admits of easy and rational explanation by some psychologists. There are various instances on record where, in a similar way, an alarm of fire has instantly cured an hysterical paralysis that had lasted for years.

In the cases already noticed, the patient is not guilty of willfully deceiving the physician; but in other instances they are found to practice the most remarkable impositions, pretending by various frauds to be suffering from spitting of blood, from stone in the bladder, etc., or to be living without food of any kind.

Hysteria is a very troublesome affection to deal with, because it is very readily induced by example, or, as Dr. Watson terms it, is propagable by moral contagion. If, in a hospital ward or in a factory where many young women are congregated, one girl goes off in a fit, all the others who may happen to have a hysterical tendency will prob-

ably follow her example. In such cases, a decided order that the next girl who is attacked shall be treated with the actual cautery, or even with the cold affusion, will often have a marvelous effect in checking the spread of the disorder.

During the fit, the treatment to be adopted is to prevent the patient from injuring herself, to loosen her dress, and to admit an abundance of fresh cool air; to dash cold water upon the face and chest; and, if she can swallow, to administer a couple of ounces of the asafœtida mixture, or a drachm of the ammoniated tincture of valerian in a wine-glass of water. After the paroxysm is over, the patient should have an active purge, and the bowels should be kept properly open by aloetic aperients; and the shower-bath, preparations of iron, and tonic treatment generally should be adopted, and all abnormal bodily and mental excitement, such as late parties in hot rooms, novel-reading etc., carefully avoided.

HYSTEROT'OMY. See CÆSAREAN OPERATION, *ante*.

HYS'TRIX AND HYSTRI'CIDÆ. See PORCUPINE.

HYTHE (A.-S. *haven*), a parliamentary and municipal borough and market-t: of England, and one of the Cinque ports (q.v.), in the county of Kent, 14 m. s. of Canterbury, and about half a m. from the coast of the English channel, at the e. end of Romney Marsh. Lympne or Limne (the *portus lemanis* of the Romans), the ancient castle and harbor, about 2½ m. w. of Hythe, is now about two m. from the coast, the sea having gradually retired, first, to w. Hythe, and then to the present haven, which is still silting up. The town stands chiefly at the foot of a cliff, and consists of one main street, running parallel to the sea, with smaller ones branching off. It has an interesting church, partly Norman and partly early English. Under the chancel of the church is an extraordinary collection of human skulls and bones—many of the skulls having deep cuts in them—the age and origin of which are altogether uncertain. Hythe is now a place of great resort in the bathing season. The parliamentary borough of Hythe includes Folkstone, Sandgate, and some smaller places. Pop. of municipal borough, which includes w. Hythe, '71, 3,383. Hythe is about a m. from the Folkstone and Dover railway.

HYTHE SCHOOL OF MUSKETRY. See MUSKETRY, SCHOOL OF.

HYTÚ, or ITÚ, a t. in the province of San Paulo, Brazil; pop. 10,000. It is in a fertile region on the Feite river, and has a large trade in mules.

I

I, THE ninth letter in the alphabets of western Europe, was called by the Greeks *Iota*, after its Shemitic name (Heb. *Jod*), which signifies "hand." The oldest forms of the letter, as seen in the Phenecian and Samaritan, have a rude resemblance to a hand with three fingers; but by gradual simplification, the character came to be the smallest in the alphabet, and "iota" or "jot" is a synonym for a trifle. The original sound of the letter, and that which is considered its proper sound in all languages except English, is that given to Eng. *e* in *me;* with this power, it forms one of the fundamental vowels *i, a, u* (see A and LETTERS). What is called the long sound of *i* in Eng. is really the diphthong *ai* rapidly pronounced. The power that the vowel *i*, followed by another vowel, has of turning the preceding consonant into a sibilant, has been noticed in regard to the letter C (q.v.); further instances may be seen in such French words as *rage, singe,* from Lat. *rabies, simia*. In Lat. there was but one character for the vowel *i* and the semi-vowel now denoted by the character *j*. See J.

IABA'DIUS, a name given by Ptolemy to an immense island of the East Indies near Malacca. It abounded in grain and gold. It is thought by most investigators to be Java.

IAL'YSUS, an important Doric city of the island of Rhodes, very flourishing in the time of Homer, remains of whose former greatness are still found in the village of Ialisco. Of its origin nothing is known.

IAMBIC VERSE, a term applied in classic prosody, and sometimes in English, to verses consisting of the foot or meter called *iambus*, consisting of two syllables, of which the first is short, and the second long (⏑ –). Archilochus (q.v.) is the reputed inventor of iambic verse. The English language runs more easily and naturally in this meter than in any other. See METER, VERSE.

Thĕ stăg | ăt ēve | had drūnk | hĭs fill.
Lady of the Lake.

IAM'BLICHUS, the proper name of several persons in classical antiquity, as—1. A king of Emesa, who, in the civil war, took the part of Antony.—2. A Syrian freedman, who flourished at the end of the reign of Trajan and beginning of that of M. Aurelius (117–69 A.D.). He was instructed by a Babylonian in the language, manners, and literature of Babylon, and wrote the *Babylonica*, or loves of Rhodanes and Sinonis, in 16 or 39 books, which has been preserved by Photius, c. xciv., and Leo Allatius. It is

the oldest of the novels of antiquity which has reached the present day; but is not of any great merit either as to style or plot.—3. A philosopher who flourished under Constantine about 310 A.D., born of an illustrious and wealthy family at Chalcis, in Cœle-Syria, pupil of Anatolius and Porphyry, and of the Neo-Platonic school of Plotinus, whose doctrines he extended. Little is known of his life; but he was followed by a numerous school, who listened with enthusiasm and respect, and who thought that he was inspired, had intercourse with the gods, and could divine and perform miracles. This gave him immense credit. His doctrines were a syncretic mixture of Pythagorean and Platonic ideas, mixed with superstition and magic, and the supposed manifestation of God by ecstasies, and a communication with the spiritual world by ceremonies. One of his great works: On the Choice of Pythagoras (*Peri Aireseos Pythagorou*) consisted of 10 books, of which there remains the 1st, A Life of Pythagoras, filled with prodigies, and evidently written against Christianity. 2d, An Exhortation to Philosophy (*Protreptikoi Logoi eis Philosophian*), an ill-arranged introduction to Plato. 3d, On the Common Knowledge of Mathematics (*Peri Koines Mathematikes Epistemes*), full of fragments of Pythagoras, Philolaus, and Archytas. 4th, On the Arithmetical Introduction of Nicomachus. The 5th and 6th books are lost. The 7th, The Theology of Arithmetic (*Ta Theologoumena tes Arithmetikes*); the 8th, The History of Music; the 9th, Geometry; the 10th, On the Study of Heavenly Bodies. He also wrote a work on the Soul, commentaries on Plato and Aristotle, another on the complete Chaldean philosophy, another on Beginnings, and one on Sacred images, in which he affirmed that the gods resided in their statues. His celebrated work on the Mysteries (*Peri Musterión*) is, however, disputed; it is supposed by Meiners not to be written by Iamblichus; but is asserted by Tennemann to be the work of this author. It is drawn up as the answer of Abammon, a priest, to a letter addressed to his pupil, Anebo, by Porphyry. It contains many Egyptian doctrines, and esoterical explanations derived from the Hermetic books, the writings of Bitys and others, mixed with Pythagorean and Neo-Platonic ideas. The style of Iamblichus is not careful, and is inferior to Porphyry. Iamblichus is supposed to have died at Alexandria, 333 A.D.—Several other writers of this name are known, as a younger philosopher of the Neo-Platonic school, born at Apamea, and supposed to be a nephew of the preceding, praised by Libanius to Julian the apostate; another, son of Himerius, mentioned by the same author, and a physician at Constantinople.

Eudocia, *Violetum*, p. 244; Eunapius, *Vit. Philosoph.*, p. 20; Hebensbreit, *De Iamblicho* (Leip. 1744); Brucker, *Hist. Crit. Phil.*, ii. p. 260; *Iamblichus*, a Gale, fo (Ox. 1678).

IAN'THINA. See JANTHINA, *ante*.

IAP'ETUS, supposed by some to be the Japhet of the Bible. The Greek and Roman mythology considered him as the father of the human race. In classic mythology he is the son of Cœlus and Terra, and father of Atlas, Prometheus, and Epimetheus.

IBAR'RA, or SAN MIGUEL DE IBARRA, a t. of Ecuador, South America, in the department of Quito, and 60 m. n.e. of the t. of that name. It is situated on the northern base of the volcano of Imbabura, is well built, and carries on manufactures of wool and cotton. Pop. estimated at about 10,000.

IBE'RIA, a parish of Louisiana, lying on the gulf of Mexico, and intersected by Bayou Teche; 600 sq.m.; pop. '70, 9,042. Soil, fertile; surface, low and level; staple products: cotton, maize, and sugar-cane. There are forests of cypress and live-oak and beds of rock-salt. Cap., New Iberia.

IBE'RIA. See HISPANIA and GEORGIA.

IBE'RIS. See CANDYTUFT.

IBERVILLE, a parish of Louisiana, bounded w. by Atchafalaya bayou and e. by the Mississippi; 450 sq.m.; pop. '70, 12,347. The surface is low and level, and often inundated; land near the rivers is fertile. Staple products: cotton, maize, sugar, and molasses. Cap., Plaquemines.

IBERVILLE, co. of Quebec, Canada, e. of the river Richelieu; 190 sq.m.; pop. '70, 15,413; traversed by the Vermont Central, the Stanstead, Shefford, and Chambly railroads. Cap., Iberville.

IBERVILLE, PIERRE LE MOYNE, Sieur d'; 1661–1706; b. Montreal; one of five brothers distinguished in the French service. In 1686 he joined the expedition of De Troye from Canada against the English forts on Hudson's bay; in 1690 took part in the Indian and French massacre of the inhabitants of Schenectady; in 1694 captured Fort Nelson on Hudson's bay; in 1696 destroyed St. John's, Newfoundland, taking most of that province from the British; and in 1697 defeated them in naval fights in Hudson's bay. Sailing from Brest in 1698 with two frigates he reached the mouth of the Mississippi with his brother Bienville; fortified Biloxi, the first post on the Mississippi, and in 1700 ascended the river. In 1701, on account of the unhealthiness of the climate, he transferred the colony from Louisiana to Mobile, and began the settlement of Alabama. In 1702 he fortified Dauphin island, in Mobile bay; in 1706, with three ships, he captured the isle of Nevis, one of the Leeward group. He died at Havana, Cuba, July 9.

I'BEX, the ancient name of the bouquetin (q.v.), or steinbock of the Alps; and now, according to some zoologists, of a genus of the goat family, or subgenus of goat, having the horns flat, and marked with prominent transverse knots in front, whereas those of the true goats are compressed and keeled in front, and rounded behind. The species are all inhabitants of high mountainous regions. The ibex of the Caucasus and the ibex of the Pyrenees differ a little from the ibex of the Alps, and from one another, but the differences may perhaps be regarded as those of varieties rather than of species.

The conventional ibex represented in heraldry resembles the heraldic antelope in all respects, except that the horns are straight and serrated.

IBICUI', or IBICUY, an important affluent of the Uraguay (q.v.).

I'BIS, a genus of birds of the family *ardeidæ*, or, according to some ornithologists, of *scolopacidæ*, and perhaps to be regarded as a connecting link between them. The bill is long, slender, curved, thick at the base, the point rather obtuse, the upper mandible deeply grooved throughout its length. The face, and generally the greater part of the head, and sometimes even the neck, are destitute of feathers, at least in adult birds. The neck is long. The legs are rather long, naked above the tarsal joint, with three partially united toes in front, and one behind; the wings are moderately long; the tail is very short. The SACRED IBIS, or EGYPTIAN IBIS (*I. religiosa*), is an African bird, 2 ft. 6 in. in length, although the body is little larger than that of a common fowl. The GLOSSY IBIS (*I. falcinellus*) is a smaller species, also African, but migrating northwards into continental Europe, and occasionally seen in Britain. It is also a North American bird. Its habits resemble those of the sacred ibis. Its color is black, varied with reddish-brown, and exhibiting fine purple and green reflections. It has no loose pendent feathers.—The WHITE IBIS (*I. alba*), a species with pure white plumage, abounds on the coasts of Florida. Audubon saw multitudes on a low islet, and counted 47 nests on a single tree.—The SCARLET IBIS (*I. ruber*) is a tropical American species, remarkable for its brilliant plumage, which is scarlet, with a few patches of glossy black.—The STRAW-NECKED IBIS (*I.* or *geronticus spinicollis*) is a large Australian bird of fine plumage, remarkable for stiff naked yellow feather-shafts on the neck and throat.

The SACRED IBIS, one of the birds worshiped by the ancient Egyptians, and called by them *hab* or *hib*, and by the modern Egyptians *abu-Hannes* (i.e., father John), is a bird with long beak and legs, and a heart-shaped body, covered with black and white plumage. It was supposed, from the color of its feathers, to symbolize the light and shade of the moon, its body to represent the heart; its legs described a triangle, and with its beak it performed a medical operation; from all which esoterical ideas it was the avatar of the god Thoth or Hermes (see HERMES), who escaped in that shape the pursuit of Typhon, as the hawk was that of Ra, or Horus, the sun. Its feathers were supposed to scare, and even kill the crocodile. It appeared in Egypt at the rise, and disappeared at the inundation of the Nile, and was thought, at that time, to deliver Egypt from the winged and other serpents which came from Arabia in certain narrow passes. As it did not make its nest in Egypt it was thought to be self-engendering, and to lay eggs for a lunar month. According to some the basilisk was engendered by it. It was celebrated for its purity, and only drank from the purest water, and the most strict of the priesthood only drank of the pools where it had been seen; besides which, it was fabled to entertain the most invincible love of Egypt, and to die of self-starvation if transported elsewhere. Its flesh was thought to be incorruptible after death, and to kill it was punishable with death. Ibises were kept in the temples, and unmolested in the neighborhood of cities. After death they were mummied, and there is no animal of which so many remains have been found at Thebes, Memphis, Hermopolis Magna, or Eshmun, and at Ibiu or Ibeum, 14 m. n. of the latter place. They are made up into a conical shape, the wings flat, the legs bent back to the breast, the head placed on the left side, and the beak under the tail. They were prepared as other mummies, and wrapped up in linen bandages, which are sometimes plaited in patterns externally. At Thebes they are found in linen bandages only: at Hermopolis well preserved in wooden or stone boxes of oblong form, sometimes in form of the bird itself, or the god Thoth; at Memphis in conical sugar-loaf-shaped red earthen-ware jars, the tail downwards, the cover of convex form, cemented by lime. There appear to be two sorts of embalmed ibises—a smaller one of the size of a corncrake, very black, and the other black and white—the *ibis numenius*, or *ibis religiosa*. This last is usually found with its eggs, and with its insect food, the *pimelia pilosa*, *akis reflexa*, and portions of snakes, in the stomach. It is said to resemble the ibis of India rather than that of Africa. By the Jews it was held to be an unclean bird.—Wilkinson, *Manners and Customs*, v. 7, 217; Passolocgua, *Catalogue Raisonné*, p. 255; Pettigrew, *History of Mummies*, p. 205; *Horapollo*, i. c. 30, 36.

IBN-GANACH, ABULWALID MERWAN, or JONAH DJANAH, 995–1050; b. Cordova; a distinguished Jewish scholar. Removing to Saragossa he gave up the practice of medicine to devote himself to philological studies. His greatest work consists of two parts; the first chiefly a Hebrew grammar, and the second a Hebrew lexicon. The original is at Oxford, where it was of great service to Gesenius in the preparation of his thesaurus. Specimens of it, given by Gesenius and translated by Dr. Robinson, were published in the *American Biblical Repository*, 1833. The part which treats of Hebrew

grammar was published by Kirchheim (Frankfort-on-the-Main, 1856). "This gigantic work is the most important philological production in the Jewish literature of the middle ages. The mastery which it displays of the science of the Hebrew language in all its delicate points, the lucid manner in which it explains every grammatical difficulty, and its sound exegetical rules, have few parallels up to the present day." Ibn-Ganach was a proficient, also, in metaphysical studies, and composed a treatise on logic, in which he followed Aristotle. He strenuously opposed the speculations of Ibn-Gebirol and others of his day on the relation of God to the world as, in his view, dangerous to the maintenance of faith in the Scriptures.

IBRAHIM PASHA, the adopted son of Mohammed Ali, the viceroy of Egypt, was b. in 1789, and gave the first proofs of his gallantry and generalship in 1819, in quelling the insurrection of the Wahabis. He afterwards subdued Sennaar and Darfur. He invaded the Morea at the head of an Egyptian army in 1825, with the view of reducing it under the power of Mohammed Ali; but the intervention of the great powers in the affairs of Greece compelled him to abandon this enterprise in 1828. Mohammed Ali having conceived the design of adding Syria to his dominions, Ibrahim crossed the Egyptian border with an army in Oct., 1831, took Acre by storm, and quickly made himself master of the whole of Syria. A peace was concluded on May 4, 1833, the Turks not only consenting to give up Syria, but also making over Adana to Ibrahim personally, on a kind of lease. When war broke out again between Mohammed Ali and the sultan in 1839, Ibrahim was again successful, totally routing the Turks in the great battle of Nisib on June 24. The interference of the great powers eventually compelled him to relinquish all his Syrian conquests, and to return to Egypt. During his passage through the desert he suffered the most terrible hardships and losses, and the attempt to elevate Egypt to complete independence came to an end. In 1848, when the aged viceroy had sunk into absolute dotage, Ibrahim Pasha went to Constantinople, and was installed by the porte as viceroy of Egypt; but on Nov. 9, 1848, he died at Cairo. He was succeeded, not by any of his own children, but by Abbas Pasha, the favorite grandson of Mohammed Ali.

IBRAIL'. See BRAHILOV.

IB'YCUS, a Greek lyric poet, b. at Rhegium, Italy, in the 6th c. B.C.; lived mostly at Samos in the court of Polycrates. His writings are known only by fragments. A legend relates that when traveling he was waylaid by robbers near Corinth, and murdered. Looking up, mortally wounded, he saw a flock of cranes flying overhead, and implored them to avenge his death. The murderers went to Corinth, and in the theater saw the cranes hovering over the people. One of the murderers, in terror, cried out, "Behold the avengers of Ibycus." Inquiry led to discovery and punishment.

ICA, a t. of Peru, 170 m. s.s.w. from Lima, and connected by railway with Pisco, its port. It exports much wheat, maize, olive-oil, wine, and brandy.

ICARUS. See DÆDALUS, *ante.*

ICE is water in the solid form. It is specifically lighter than water which is just about to freeze, and therefore swims in it. Water, in becoming solid, expands about one-ninth of its volume or bulk. The formation of ice takes place generally at the surface of water. This is owing to the peculiarity, that when water has cooled down to within 7°.4 of freezing, it ceases to contract, as before, with increase of cold, and begins to expand until it freezes; which causes the coldest portions of the water to be always floating on the surface. In some circumstances, however, not very well explained, ice forms at the bottom of rivers, and is called ground-ice.

Water in ordinary cases freezes at the degree of heat marked 32° on Fahrenheit's thermometer, and 0° on the Centigrade and Reaumur's; but if it is kept perfectly still, it may be cooled to nearly 22° F. below freezing, and still remain liquid. The least shake, however, or the throwing in a solid body, makes a portion of it freeze instantly, and its temperature rises immediately to 32°. Sea-water, and salt water in general, freezes at a lower temperature than pure water; in doing which, part of the salt separates, and the ice, when melted, gives water that is fresher than the original The color of pure ice is deep blue, which is only descernible, however, when it is in large masses. It is best seen in the clefts of a glacier or an iceberg.

In the neighborhood of the poles, and on mountains of a certain height in all latitudes, there exist immense masses of permanent ice; and even in some districts of Siberia, where a kind of culture is practicable in summer, there are found at a certain depth below the surface of the earth strata of ice mingled with sand. In sinking a well at Yakutsk the soil was found frozen hard to the depth of 382 ft., and consisting in some parts entirely of ice. These permanent masses of ice must be classed with rocks and mountains, as among the solid constituents of the globe. In the lower regions of the torrid zone there is no ice, and in the temperate zones, it is a passing phenomenon. From the polar ice-fields and glaciers, which are always protruding themselves into the sea, great floating masses become detached, and form *icebergs*, floes, and drift-ice. These bergs or mountains of ice are sometimes more than 250 ft. above the sea-level. They present the appearance of dazzling white chalk-cliffs of the most fantastic shapes. Fresh fractures have a green or blue color. From the specific gravity it is calculated

that the volume of an iceberg below the water is eight times that of the protruding part. Icebergs, and floes or ice-fields, are often laden with pieces of rock and masses of stones and detritus, which they have brought with them from the coasts where they were formed, and which they often transport to a great distance towards the equator. These floating masses of ice are dangerous to navigation.

The hardness and strength of ice increase with the degree of cold. In the severe winter of 1740 a house was built of the ice of the Neva at St. Petersburg 50 ft. long, 16 wide, and 20 high, and the walls supported the roof, which was also of ice, without the least injury. Before it stood two ice-mortars and six ice-cannon, made on the turning-lathe, with carriages and wheels also of ice. The cannon were of the caliber of 6-pounders, but they were loaded with only ¼ lb. of powder, and with hemp-balls—on one occasion with iron. The thickness of the ice was only four inches, and yet it resisted the explosion.

About 24 years ago Faraday called attention to a remarkable property of ice, since (incorrectly) called regelation. He endeavored to account for the fact that two slabs of ice, with flat surfaces, placed in contact, unite into one mass when the temperature of the surrounding air is considerably *above* the freezing-point, by assuming that a small quantity of water, surrounded on every side by ice, has a natural tendency to become ice; and the fact that two blocks of ice placed in contact do not unite unless they are *moist* seems to bear out this idea. But J. Thomson gave a totally different explanation of this phenomenon. He showed that the capillary force of the film of water between the plates is sufficient to account for a very considerable pressure between them; so that from his point of view the phenomenon would be identical with the making of snowballs by pressure; and the formation, by a hydraulic press, of clear blocks from a mass of pounded ice, an observed fact, the explanation of which is to be found in the property of ice mentioned below. See *Proceedings of the Royal Society*, 1860–61. Faraday, taking up the question again, showed that the (so-called) regelation takes place in *water* as readily as in air, a fact quite inconsistent with the action of capillary forces. To this J. Thomson replied, showing, very ingeniously, that the capillary forces he at first assumed are not necessary to a complete explanation of the observed phenomena. See reference above.

Other views of the question are numerous, for instance, that of Persoz, adopted by Forbes, in which ice is considered as essentially colder than water, and as passing through a sort of viscous state before liquefying, as metals do during the process of melting. This idea, however, has not of late found much support; and it is probable that the true solution of the question is, as J. Thomson has lately pointed out, to be found in the analogy of the crystallization of salts from their aqueous solutions.

However that may be, there is no doubt about the following property of ice, theoretically predicted by J. Thomson from the experimental fact of its expanding in the act of freezing, and demonstrated by means of the piezometer by sir W. Thomson—viz., that the freezing-point of water, or the melting-point of ice, is *lowered by pressure;* and the brothers have, with singular ingenuity, applied this to the explanation of the motion of glaciers. That a mass of glacier-ice moves in its channel like a viscous fluid, was first completely established by Forbes. Thomson's explanation of this motion is of the following nature: In the immense mass of the glacier (even if it were homogeneous, much more so when full of cracks and fissures, as it always is), there are portions subjected to a much greater strain than others. The pressure to which they are subjected is such as corresponds to a melting-point considerably *below* the temperature of the mass—and therefore, at such points, the ice melts, the strain is relieved, and the whole mass is free for an instant to move nearly as a fluid would move in its place. But, the strains being thus for an instant removed, the temperature and pressure of the water are again consistent with freezing—the thin layer of water quickly solidifies, and then matters proceed as before. Thus, at every instant, the strains at different parts of the mass melt it at those places where they are greatest, and so produce the extraordinary phenomenon of a mass which may in common language be termed *solid*, and even *rigid*, slowly creeping down its rocky bed like a stream of tar or treacle.

Ice-Trade and Manufacture.—The trade in ice is now one of great and increasing importance. Ice has always been esteemed as a luxury in warm weather; and this early led to the storing of it in winter and preserving it for summer use. The Greeks, and afterwards the Romans, at first preserved snow, closely packed in deep underground cellars. Nero, at a later period, established ice-houses in Rome, similar to those in use in most European countries up to the present time. But these means were not enough to supply the luxurious Romans with ice for cooling beverages, and they actually established a trade in snow, which was brought to Rome from the summits of distant mountains.

The trade in ice in this country has, until lately, been very limited, having been chiefly confined to the supply required by a few of the first-class fishmongers and confectioners—the private residences of the more opulent families being furnished with ice-houses in which a sufficiency is kept for private use. But the North Americans have started a trade in this article in their own cities, which has extended to Europe and Asia, and has, in an incredibly short space of time, attained a surprising magnitude. The export of ice from America was commenced about 1820 by a merchant named Tudor, who sent ice from Boston to the West Indies. After persevering against many losses he

succeeded in establishing a trade with Calcutta, Madras, and Bombay; and now not only is it sent in vast quantities to those places, but also to Hong-Kong, Whampoa, and Batavia. About the year 1840 the Wenham lake ice company commenced sending ice to this country from Boston, which is the great American port for shipment of this material; and since then not only has there been a continually increasing demand, but the success of the company has been so great as to tempt others into the market. The supply for Great Britain, however, now comes almost wholly from Norway; 184,021 tons having been imported thence in 1876, of the value of £167,092, whilst only 10 tons were received from other countries. Fifteen or twenty years previous America had sent to Great Britain on an average 20,000 tons annually, costing as many thousand pounds.

In America the ice is chiefly collected in the neighborhood of Boston, Philadelphia, Baltimore, Washington, and New York, and the lakes which supply it form no small part of the property of those whose lands border thereon; these have all been carefully marked out, and the right secured, so that, when the winter comes, and the ice is formed, the harvest begins with great regularity. The ice is cleared from snow by means of an implement called the plane. An ice-plow, drawn by horses, and driven by a man riding upon it, is then made to cut deep parallel grooves in the ice, and these are again crossed by other grooves at right angles, so that the whole of the surface is deeply marked out into small squares, measuring a little more than 3 feet. A few of these square blocks being detached by hand-saws, the remainder are easily broken off with crowbars, and floated away to the ice-storehouses, which are usually built of wood, on the borders of the lake. Some of these are of vast dimensions, and contain vaults of great depth; the walls are double, and sometimes treble, being altogether as much as 4 ft. in thickness, and having hollow spaces between to render them less heat-conducting. The blocks of ice are covered up with sawdust, a layer being placed between each tier of blocks. Many of these ice-houses are made large enough to hold from 40,000 to 50,000 tons of ice. When fully stored a large quantity of dried marsh grass is trodden in upon the top, to the thickness of several feet, and the doors are then securely closed. The total value of the ice which is stored in America has been computed at £900,000, and if to this we add the ice-trade of Norway, Sweden, Russia, which, from the slight data we possess, is estimated at £600,000, we have the astounding fact that a value of one million and a half sterling is added to a comparatively small body of water by the mere act of freezing.

Notwithstanding the facilities for importing ice, there is, and always will be, a necessity for procuring it locally if possible. Hence there has been much talent brought to bear in devising means for artificial freezing. See FREEZING MIXTURES. But until recently the modes of producing ice artificially were too costly to be practically useful. The desideratum, however, may now be considered as supplied; for machines are constructed by Mr. Siebe of Lambeth capable of producing ten tons per day. Such a machine requires steam-power to work it, and its action consists in evaporating ether or any similarly volatile liquid *in vacuo*, and again condensing the vapor to liquid, so as to be used afresh. By this machine, 20° F. below zero (52° of cold) has been easily obtained, and such a machine is now regularly producing large quantities of ice nearly under the equator in Peru, where previously ice had never been seen; and others are used in India and at the Cape in the service of the government, for the use of the troops and hospitals. Another machine was first shown in the London exhibition of 1862 by the French firm of Carré & Co., which, from its extreme simplicity, and the fact that it can be adapted to the humblest kitchen, has led to its extensive application. The price is from £4 upwards; and as the volatile liquid is only the aqueous solution of ammonia, the cost of working it is very slight. The importance of low temperatures in many manufactures has lately increased the demand for freezing-machines, and they are now of great size and power. The machine-made ice has the same valuable quality that distinguishes the imported lake ice, viz., its perfect purity, so that pieces can be put into the drink that is to be cooled.

ICEBERG. See ICE.

ICELAND, an island in the northernmost part of the Atlantic, on the confines of the Arctic ocean; in n. lat. 63° 23′ to 66° 33′, and w. long. 13° 22′ to 24° 35, distant about 600 m. from Norway, and 250 from Greenland, 250 from the Faröe isles, and about 500 from the n. of Scotland. It belongs to the kingdom of Denmark. Its extent is about 39,207 sq.m.; its extreme length from e. to w. is upwards of 300 m., its greatest breadth from n. to s. about 200. Its coasts, particularly on the n. and w., are very much broken by bays or *fiords*. In some of the bays are numerous small islands. Iceland is in many respects one of the most interesting parts of the world. Its physical features are very remarkable, and not less so its history and the character of its inhabitants. It consists in great part of lofty mountains, many of which are active volcanoes; only certain level districts along the coasts, and a few dales, are habitable, or in any degree capable of cultivation, whilst even there scarcely a tree is to be seen, and the climate is unsuitable for grain. The interior of the island is almost entirely occupied with rugged tracts of naked lava and other volcanic products, vast ice-fields in many places connecting its high mountain summits, among which are prodigious glaciers, in some instances descending even to the coast, they and the torrents which gush from them

rendering communication between one inhabited spot and another very difficult and dangerous. Yet here has civilization been long established, and the people, necessarily very poor, have cultivated poetry and other departments of literature with great success.

The highest mountain in the island is Oeräfa Jökul, which attains a height of 6,426 ft. above the level of the sea. It is situated on the s.e., and is connected with a vast mountain mass, of which several of the summits are actively volcanic, no less than 3,000 sq.m. being perpetually covered with ice and snow at an elevation varying from 3,000 to above 6,000 ft., whilst all underneath seems to be full of either active or smoldering volcanic fire. The most celebrated volcano is Hecla (q.v.). Krafla is perhaps the most noted of a great group of active volcanoes in the n. of the island. The eruptions of Hecla have caused no little devastation, but still more terrible and destructive have been those of Skaptár Jökul and other volcanoes of the same mountain mass, which burst forth for the first time within the historic period in 1362. In repeated instances volcanic islets have been thrown up in the bays and near the coasts of Iceland, which have generally disappeared again within a short time. Connected with the volcanic fires are also hot springs in great number, some of which flow gently, and others, called *geysers* (q.v.), gush up at intervals and with ebullitions of great violence. Numerous hot springs may in many places be seen sending up their steam in a single little valley, and the Icelanders are accustomed to avail themselves of them for the washing of clothes and other purposes. The water of some is merely lukewarm, whilst that of others is boiling; some are pure, and some sulphureous. They are subject to great variations, and appear and dry up very suddenly. Earthquakes are frequent, and the island suffered very severely from this cause in 1755 and 1783. The winter is not generally more severe than that of Denmark, although more protracted, and it is rather the shortness of the summer and the insufficiency of summer heat, with the superabundance of moisture, than the severity of the winter, which is unfavorable to the growth of corn and plants of many other kinds. In the southern portions of Iceland the longest day lasts 20 hours; the shortest, 4 hours. In the northern districts the sun never sets for a whole week in midsummer, and in midwinter never rises above the horizon during an equally long period of time.

About 20,000 oxen, 30,000 horses, and 400,000 sheep constitute the chief part of the wealth of the inhabitants. The horses are small, but vigorous and active. They receive little attention from their owners, whose oxen require almost all the hay and other fodder they can store up for winter. Iceland ponies have now begun to be imported into Britain. Reindeer were introduced into Iceland by a public-spirited governor in 1770, and have become naturalized in the uninhabited tracts of the interior, where, however, their presence is of little importance. Seals abound on the coasts, where sea-fowls are also extremely numerous, and their flesh, eggs, and feathers are much sought after. Swans and other *anatidæ* frequent the lakes. The eider duck is plentiful on many parts of the coast, and its down is a principal article of commerce. Fish of many kinds are abundant on the coasts, salmon and trout in the rivers. The food of the people consists in great part of fish. The cod-fishery is extensively prosecuted by the French, from two to three hundred French vessels and about 7,000 seamen being employed in it, under the immediate patronage of the French government, which aims at thus training seamen for the navy. The salmon-fishery of some of the rivers has begun to be prosecuted for the supply of the London market. The herring-fishery has not hitherto received special attention, but vast shoals of herrings frequent the fiords. The most important agricultural operations are those of the hay-harvest. The seeds of the *melur*, or upright sea lyme grass (*elymus arenarius*), are gathered and used for making pottage and cakes, and are much relished; bread made of imported grain being rather a luxury in the houses of the common people. Meal made of Iceland moss (q.v.) is used in a variety of ways, and the lichen is gathered in large quantities both for home use and for exportation. Potatoes, turnips, kale and cabbage, spinach, parsley, radishes, mustard, cresses, etc., are produced in gardens. The mineral wealth of Iceland has only begun to be developed. In no part of the world is sulphur found in such abundance. Iron ore is also found. There is a peculiar kind of brown coal called *surtarbrand* (q.v.), which, along with driftwood, is much used for fuel on the northern and eastern coasts.

It is supposed that the population of Iceland was once 100,000, but it subsequently diminished. Since 1840, when it amounted to 57,094, a gradual increase has taken place, until in 1870 it had reached 69,763. The people, who are of Scandinavian origin, are distinguished for honesty, purity of morals, and a wonderful love of education. Notwithstanding their poverty and other adverse circumstances, it is rare to find an Icelander who cannot read and write. They belong to the Protestant church. The clergy are, like their parishioners, very poor; they are under one bishop. The Icelanders are strongly attached to their native country, and delight in the study of its history as set forth in ancient *sagas* and poems. Their language is the old Norwegian, preserved in almost its pristine purity. See SCANDINAVIAN LANGUAGES AND LITERATURE. They are rather a small race, and seldom attain to a great age. Scurvy was a very common disease, and cases of elephantiasis were frequent, probably owing in a great measure to the nature of their food, and still more to their miserably crowded and unventilated dwellings, which are mostly cottages of the humblest description, built of turf or of pieces of lava, the crevices stuffed with moss, and the roof formed of turf. The former of these diseases has now entirely disappeared, and the latter is

becoming very rare. The knitting of stockings and gloves is a common kind of domestic industry, and with the sale of skins, wool, feathers, eider-down, fish-oil, etc., enables the peasantry to procure a few articles of foreign produce. The chief imports are rye, barley, flour, coffee, liquors, tobacco, sugar, coal, iron, etc. Upwards of 40,000 Danish barrels of grain (of all kinds) are annually imported: also about 427,000 lbs. of coffee, 448,000 qts. of various liquors, 109,000 lbs. of tobacco, 457,000 lbs. of sugar, and 32,000 chaldrons of coal. The annual exports are valued at about £400,000, and consist of dried fish, wool, hosiery, tallow, train-oil, lard, salt meat, feathers, skins, and horses. The destruction of meadows by volcanic eruptions, and the interruption of fishing by drift-ice, have sometimes caused great distress. Since 1855 free-trade has been in force; 32 authorized trading-places have been opened, of which Reykiavik, with a pop. of 2,024, and situated at the head of a bay in the s.w. of the island, is the most important. Here the governor resides, and the *althing*, a kind of parliament, is held; here are a college, medical and theological schools, a public library of 10,000 volumes, a royal Icelandic society, and an observatory; and newspapers and Icelandic books are printed. There is regular steam-communication during summer with Leith and Copenhagen.

The authentic history of Iceland begins with the latter half of the 9th c., when emigrants from Norway settled here. The Landnama Book, however, one of the earliest of the records of the island, states that the Christian relics found here by the Norwegians on their arrival—as wooden crosses, etc.—had been erected previously by Irish settlers. However this may be, it is certain that the first authentic successful settlement of Iceland was made under Ingolf, a Norwegian, who, after a fruitless attempt on the s. coast in 870, succeeded in establishing himself at Reykiavik in 874. The changes introduced in Norway by Harald Haarfager caused many who could not endure them to betake themselves to other countries, and particularly to Iceland, all the habitable coast districts of which were occupied within sixty years, and the old Norwegian institutions were transferred to it unmodified. The government was at first, in the times of paganism, hierarchic and aristocratic; it became afterwards a kind of aristocratic republic. The althing met every summer in the valley of Thingvalla. Christianity was not established by law till 1000 A.D., and then not without much opposition. Schools were then founded, and two bishoprics in Holar and Skalholt.

The Icelanders were enterprising sailors in the early periods of their history, and discovered Greenland about the year 982, and a part of the American coast, which they called *Vineland*, about 990. They made voyages also to the south, visiting the furthest parts of the Mediterranean. The most flourishing period of Icelandic literature and commerce was from the middle of the 12th to the beginning of the 13th c., when, in consequence of domestic broils, Haco V. of Norway succeeded in reducing the whole island under his sway in 1262, and a declension began, which continued till a new impulse was given to the minds of men, here as elsewhere, by the reformation. When Norway was united to Denmark in 1380, Iceland shared its fate, but was not transferred along with Norway to a new allegiance in 1814. The Protestant religion was introduced in 1540, but not fully established till 1551. In the 17th c. the island suffered much from the ravages of Algerine pirates, who carried away many persons to slavery. In 1707 small-pox carried off 18,000 persons; in 1784–85 about 9,000 died of famine.—The althing, after it had subsisted for fully 900 years, was suppressed in the 19th c., but was reorganized in 1843. By the new constitution for Iceland of Jan., 1874, the althing has obtained legislative powers in all matters concerning Iceland. —See Von Troil, *Letters on Iceland*, 1772; sir George Mackenzie, *Travels in Iceland*, 1810; Henderson, *Journal of a Resident in Iceland*, 1818; C. S. Forbes, *Iceland, its Volcanoes, Geysers, and Glaciers*, 1860; S. Baring-Gould, *Iceland, its Scenes and Sagas*, 1863; capt. Richard F. Burton, *Ultima Thule: a Summer in Iceland*, 1875.

ICELAND MOSS, *Cetraria islandica*, a lichen found in all the northern parts of the world, and valuable on account of its nutritious and medicinal properties. It is collected as an article of commerce in Norway and Iceland. In very northern regions it grows even near the level of the sea; in more southern countries, it is found on mountains. It is not uncommon in the mountainous parts of Britain, although not turned to any economic account. In Carniola it is used for fattening cattle and pigs. It grows in extreme abundance in Iceland on tracts otherwise desert; and numerous parties migrate from great distances with horses, tents, and provisions, in the summer months, for the sole purpose of gathering it, as an article of commerce, and for food. In many places, this lichen thickly covers the whole surface of the ground, growing about 1½ to 4 in. high, and consisting of an almost erect *thallus* (q.v.). It is of a leathery and somewhat cartilaginous substance. When Iceland moss is used as an article of food, its bitterness is first partially removed by steeping in water, after which, in Iceland and other northern countries, it is sometimes pounded and made into bread; or it is prepared by boiling, the first water being rejected. It is often boiled with milk, making a kind of jelly, either with milk or water. It is an agreeable article of food, and very suitable for invalids. It contains about 80 per cent of a kind of starch called *lichen starch*, or *lichenin*, and owes its bitterness to an acid principle, *cetraric acid*.—An allied species, *cetraria nivalis*, growing in northern countries, possesses similar

properties. It is very abundant in some parts of Iceland, is much used for food, and is called *Mary's grass* by the Icelanders.

ICENI, a warlike tribe of ancient Britain, occupying, as is supposed, that part of the country which corresponds nearly with the present counties of Norfolk and Suffolk. Under their queen Boadicea they rebelled against the Romans.

ICE PLANT, *Mesembryanthemum* (q.v.) *crystallinum*, an annual herbaceous plant, a native of Africa and of the s. of Europe, remarkable for the watery vesicles (*papulæ*) with which its whole surface is covered, and which have the appearance of granules of ice, and sparkle in the same manner in the sun. It is common as a tender annual in our green-houses, the peculiarity from which it derives its name making it an object of interest. The seeds are used for food in the Madeira islands. The ashes supply barilla, and the plant is burned on this account in countries where it abounds.

ICH DIEN, translated to mean "I serve," the motto of the prince of Wales. According to one theory of its derivation, the phrase was employed by Edward I. on presenting his new-born son, Edward of Carnarvon, to the Welsh, using the expression in its Welsh signification—*Eich dyn*, "Behold the man." Another view attributes it to the occasion of the killing of John, king of Bohemia, by the black prince at Cressy, and asserts that the latter found the motto under the plume worn by the dead king, and assumed it to imply that "he served under the king his father."

ICHNEUMON, *Herpestes*, a genus of digitigrade carnivorous quadrupeds of the family *viverridæ* (q.v.), having a much elongated body, small head, sharp muzzle, rounded ears, and short legs. The species, which are pretty numerous, are natives of Africa and the warmer parts of Asia. One, the ANDALUSIAN ICHNEUMON (*H. widdringtonii*), occurs in the s. of Spain. They feed on small quadrupeds, reptiles, eggs, and insects. Some of them, particularly the EGYPTIAN ICHNEUMON (*H. ichneumon*) and the MANGOUSTE or MUNGUS (*H. griseus*) of India, have been greatly celebrated as destroyers of serpents and other noxious reptiles, many wonderful fables being superadded to the truth on this subject. The Egyptian ichneumon, the ichneumon of the ancients, is larger than a cat, gray, with black paws and muzzle, and a black tuft of diverging hairs at the end of the tail. It abounds in lower Egypt, but in upper Egypt it is comparatively rare. It often enters houses, and devours poultry and their eggs. With noiseless gliding motion it advances on serpents until it can suddenly seize them behind the head, where its long sharp teeth inflict a fatal wound. It scratches up the sand for the eggs of crocodiles, which it eats with great avidity. It was a sacred animal among the ancient Egyptians; the killing of it was forbidden: and individuals, for the maintenance of which funds were set apart, were objects of worship. The ichneumon is easily domesticated, and forms a cat-like attachment to the place of its residence. It is useful in keeping houses free of rats and other vermin. It is therefore not unfrequently domesticated in Egypt, as the mangouste also is in India. This species is rather smaller, of a lighter color, and has a pointed tail.

ICHNEUMON, a Linnæan genus of insects, now constituting a family or tribe, *ichneumonidæ*, of the order *hymenoptera*, section *terebrantia*. The *ichneumonidæ* are extremely numerous. Gravenhorst's *Ichneumonologia Europæa* describes nearly 1650 European species, and they are equally abundant in other parts of the world. Many of them are minute, others are large insects; a few of the tropical species are amongst the largest of insects. They have the abdomen united to the thorax by a pedicel, which is often very slender. The abdomen itself is slender, and the whole form attenuated. The antennæ are generally thread-like, composed of a great number of joints, and are kept in very constant vibration. The ovipositor in some is short; in some it is very long, much longer than the body of the insect, and inclosed in a kind of sheath formed of two parts, concave on their inner surface, from which it is disengaged when about to be used, the whole then often seeming as three threads proceeding from the extremity of the abdomen. All the *ichneumonidæ* deposit their eggs either in or on—generally in—the bodies, eggs, or larvæ of insects, or in spiders. Some of them deposit their eggs in aphides. They are thus extremely useful to the farmer and gardener. Particular species of *ichneumonidæ* are the natural enemies of particular kinds of other insects. Thus, *microgaster glomeratus* and *pimpla instigator* lay their eggs in the caterpillars of the cabbage butterfly. Some species deposit only one egg in the egg or larva which is destined to afford food to their own larva; others deposit a number of eggs together. Those which have a long ovipositor use it to reach eggs or larvæ under the bark of trees, in holes of wood, etc. The ichneumon larvæ generally consume only the fat of the larva on which they feed, which continues to subsist and so to sustain them till they are ready for transformation into pupæ. In their perfect state, the *ichneumonidæ* feed only on the juices of flowers. They are very often to be seen flying about umbelliferous flowers. The ichneumon larvæ are without feet. The pupæ of many are inclosed in silken cocoons.

ICHNOLOGY (Gr. science of footprints) is the name given to that section of paleontology which treats of the impressions made on mud or sand, now indurated into rock, by the animals of the period to which the rocks belong, or by meteoric or other transitory physical forces. The actual remains of the hard portions of the animals them-

selves are the materials on which chiefly rest our knowledge of the former inhabitants of the globe; but of many animals we know nothing more than the more or less distinct impressions made by them as they moved over the surface of a muddy shore. And in some beds, not only is the evidence of the shore-wave preserved in the ripple-mark, and the influence of the sun's heat exhibited in the superficial cracks, but frequently the passing hail-storm, or the sudden and heavy thunder-shower, has left its impress upon them, and this so perfectly, that it is not difficult to determine, from the form of the cup-like depression, whether or not the rain was accompanied by a breeze, for, by observing the amount of difference in the sides of the cup, and the position of the highest side, the direction of the gale and its velocity may be approximately determined. Though the force or body forming the impression has been removed immediately after it has made the pressure, yet in these prints the evidences of animal life and of the activity of physical forces have come down to us from the remotest periods.

The impressions occur almost invariably on rocks that have been deposited as mud; only in a few cases have they been noticed in sandstone. Sometimes the argillaceous deposit is a thin layer between two sandstone beds; it is then difficult to obtain a clear surface in the shale; but the details are carefully preserved in relief in the natural cast on the under surface of the superimposed sandstone. In this manner the footprints are preserved at Stourton in Cheshire.

The necessary conditions for the preservation of footprints seem to be either of the following. The silt-bed may have formed an extensive flat shore, uncovered by the tide at each ebbing. Whatever impressions were made on this plastic surface would be baked and hardened by the influence of the sun, if it remained for a sufficient time uncovered by the water; and when the tide again flowed, the hardened mud, resisting its influence, would receive another film of sediment, which would specially deposit itself in the depressions, and thus secure the permanence of the impressions. These influences would operate more powerfully on portions of the shore which were under water only at spring-tides. The impressions of numerous wading birds are preserved in this manner at the present day, on the plastic mud which covers the flat shore of the bay of Fundy, where the tide rises, it is said, as much as 70 feet. Both Gould and Lyell have given detailed accounts of the process as it goes on there. The other method is one independent of the sun's influence, where, on an ordinary muddy shore during the recession of the tide, the depresssions are filled up by blown sand, and the tide, on its return, flows over a level surface, on which it deposits a fresh layer of silt.

The study of ichnology carries us back to the remotest known period of animal life on the globe. The deposit from which has been obtained the fragment of the oldest known trilobite (palæopyge), contains the borings of certain worms, and impressions of rain-drops. In strata of the same period, but a little later, series of regularly recurring groups of markings are considered by Mr. Salter as having been produced by the sharp claws of crustacea in walking; while other sets he refers, with considerable show of probability, to the strokes of the bifurcate tail of an unknown crustacean as it swam through shallow water. From the American representatives of the same rocks (Potsdam sandstones), prof. Owen has described a number of impressions made apparently by different animals, to which he has given the generic name of protichnites. The slabs show that the animals made at each step 14, 16, or more impressions, They were most probably crustacea, furnished with three or four pairs of bifurcating limbs, like the modern king-crab. Similar impressions have been observed in the lower Silurian rocks of Eskdale in Scotland, and have been named *P. Scoticus*. The tracks of numerous annelids occur also in these rocks. They exhibit the impressions of the creatures as they moved along, or sometimes through, the soft mud, and they frequently terminate in a distinct impression of the form of the worm itself, produced perhaps by the dead body, although no trace of the body itself is preserved.

The footprints of a small reptile had been observed on the sandstone of a quarry near Elgin, which most probably belongs to the old red sandstone measures. In 1851 it was discovered that they were produced by a little reptile (*telerpeton Elginense*), whose remains were there found. And more recently, prof. Huxley has referred a different set of impressions to the remarkable fish-like reptile, stagonolepis, which he describes.

The coal measures of our own country and of Germany have disclosed the footprints of different reptiles.

The new red sandstone strata abound in footprints. It was the permian or lower division of this series that supplied, in 1828, the impressions which gave the first indication of animal life from such evidences to the mind of Dr. Duncan—a man who deserves to be remembered less for his works in natural history, important though they were, than for his eminent services to his country as the founder of savings-banks. The tracks he described occur on the layers of unctuous clay which separate the beds of sandstone in the quarries at Corncockle, Dumfriesshire; they frequently are clear and delicate, as at the moment when they were impressed, and are repeated bed after bed on the fresh tablets as they were prepared for their reception. From their number and direction, they seem to be the tracks of animals passing together across a tide-receded estuary, to some frequented ground periodically sought for food or pleasure. No animal remains whatever have been found associated with them; they seem, how-

ever, to belong to forms of tortoise. The pad of the foot was soft and smooth; the light impressions of the fore-foot were nearly obliterated by the hind-foot, which was furnished with four claws. Sir William Jardine, on whose property the Corncockle quarries are, has made these tracks the subject of a valuable and elaborate monograph.

In the triassic rocks the well-known foot-tracks of the labyrinthodon (q.v.) occur.

The earliest evidence of the existence of birds are the traces of their feet in the argillaceous sandstones of Connecticut, which are now known to be of the lower oolitic age. The structure of the tridactyle feet which produced these impressions exhibits the regular progression in the number of the toe-joints from the innermost to the outermost toe peculiar to birds, and they must be taken as evidencing the occurrence thus early of the class, although a considerable interval elapses before the first true fossil of a bird occurs; namely, the remarkable long-tailed bird from the upper oolite rocks of Solenhofen, recently described by prof. Owen. Immense tridactyle footprints have been known for many years in rocks of wealden age in the s.e. of England. At first they were supposed to be birds; but a more careful examination has shown them to belong to reptiles; and the discovery in the same strata of the perfect foot of a young iguanodon, measuring 21 in. in length, and furnished with three toes, which would form a print precisely similar to the tracks so long known, shows them to have been certainly produced by the iguanodon (q.v.).

ICHNOLOGY (*ante*). The fossil footprints, or ichnolites, of crustaceans are very numerous in America. Dr. Dawson has given much attention to this study. In observing the habits of the king crab he found that in walking over a sandy beach it makes marks like those called protichnites (see *ante*). In the sandstone beds which contain the protichnites are ladder-like impressions called climactichnites, and Dr. Dawson has shown that probably they are the marks made by the same crustacean, when swimming, which, when walking, produced the protichnites. The ichnolites found in the eocene of the Paris basin are numerous, the most notable being the trilobed footprints of several species of *paleotherium* (q.v.), and also those of *anoplotherium* (q.v.).

Great interest attaches to the footprints in the mesozoic rocks of the Connecticut valley from the fact that a majority of the tracks formerly supposed to have been made by birds were made, as shown by prof. Edward Hitchcock, by a huge batrachian, or frog-like animal. In his report published by the state of Massachusetts in 1836 he states that he had found ichnolites in the new red sandstone in 38 localities. In all there were the footprints of no less than 119 species of animals, comprising quadrupeds, birds, saurians, batrachians, tortoises, fishes, crustaceans, insects, and worms. Some of the surfaces show ripple-marks, and others rain-drop marks. The collection of the Connecticut valley ichnolites is now in the museum of Amherst college, and comprises more than 8,000 distinct tracks. Ichnolites have since been found in the same formation in New Jersey, and in the lower triassic sandstones of Lancashire and Cheshire in England, and in Hildburghausen, Saxony. The European footprints somewhat resemble an impression of the human hand, and for a while were supposed to be the footprints of a quadruped called *cheirotherium*, belonging to the kangaroo family. It is now, however, thought that the tracks are those of a crocodilean called *labyrinthodon*.

ICHTHYODO'RULITE (Gr. fish-spear stone), the name given to fossil fish spines, that are not uncommon in stratified rocks. Plagiostomous fishes have their dorsal fin furnished in front with a strong bony spine. The fin is connected with the spine, and is elevated and depressed by its movement. It seems also to be employed by the fish as a defense against its larger foes. Some bony fishes have similar spines, as the stickle-backs, silurids, etc. The spines are most frequently unassociated with any fish remains, having belonged to plagiostomous fish, in which the spine is simply implanted in the flesh, and consequently would be speedily separated from the body of the fish when it began to decompose.

The earliest certain evidence of vertebrate animals is the spines of plagiostomous cartilaginous fishes which occur in the bone bed of the Ludlow rocks, the uppermost of the silurian deposits. Spines belonging apparently to three species have been found, they are small, compressed, slightly curved, and finely grooved lengthwise, and belong to the genus onchus. Along with them have been found petrified portions of tubercular and prickly skin, like the shagreen of the shark.

The old red sandstone has supplied such a variety of spines as to have afforded the materials for establishing fourteen genera, and in the coal measures they are more numerous, belonging to no less than twenty-one genera.

ICHTHYOL'OGY (Gr. *ichthys*, a fish; *logos*, a discourse), that branch of natural history which treats of fishes. Aristotle is the most ancient author having any claim to be noticed in a history of ichthyology, nor was this science much indebted to any other of the ancients. In modern times, it began to be cultivated, about the middle of the 16th c., by Belon, Rondelet, and Salviani. Towards the close of the 17th c. it made great progress through the labors of Willoughby and Ray; in the 18th c., through those of Artedi, Klein, Linné, Gronow, Brunich, Scopoli, and Bloch; in the beginning of the 19th c., through those of Cuvier and De la Cépède; whilst, more recently, Valenciennes, Müller, Agassiz, and Owen are eminent amongst many who have prosecuted the study of ichthyology with ardor and success. The name of Yarrell deserves to be particularly

mentioned for his work on British fishes. The earlier ichthyologists generally included the *cetacea* among fishes. Linné removed the *cetacea* to their proper place. He also placed the *cartilaginous fishes* with reptiles in his class *amphibia*, from which they have since been, by the common consent of naturalists, brought back to their place in the class of fishes. Linné's system of ichthyology is almost as artificial as his system of botany. It is founded on the relative positions of the pectoral and ventral fins, without reference to any important point of comparative anatomy or animal economy. Other ichthyologists, both before and since, have labored to discover a natural arrangement, to which the progress of comparative anatomy has greatly contributed, although success is still confessedly very imperfect. Even the system of Agassiz, founded on the external covering of fishes, is not wholly artificial, and is of very convenient application to fossil ichthyology.

ICHTHYOLOGY. See FISHES, VERTEBRATA, *ante*.

ICHTHYOSAURUS (Gr. fish-reptile), a remarkable genus of reptiles which inhabited the sea during the deposition of the secondary strata. Like the modern cetacea, their structure was modified to suit their aquatic life. The body was shaped like that of a fish, the limbs were developed into paddles, and the tail, long and lizard-like, was furnished, it is believed, with a fleshy fin, as in the dolphin, except that its position was vertical. The head was large, and produced into a long and pointed snout, resembling that of the crocodile, except that the orbit was much larger, and had the nostril placed close to it, as in the whale, and not near the end of the snout. The jaws were furnished with a large series of powerful conical teeth, lodged close together in a continuous groove, in which the divisions for sockets, which exist in the crocodile, were indicated by the vertical ridges on the maxillary bone. The teeth were hollow at the root, sheathing the young teeth, which gradually absorbed the base of the older ones, and, as they grew, pressed them forward, until they finally displaced them. The long and slender jaws were strengthened to resist any sudden shock by being formed of many thin bony plates, which produced light and elastic as well as strong jaws. The most remarkable feature in the head was the eye, which was not only very large—in some specimens measuring 13 in. in diameter—but was specially fitted to accommodate itself for vision in air or water, as well as for speedily altering the focal distance while pursuing its prey. The structure, which thus fitted the eye so remarkably to the wants of the animal, consists of a circle of 13 or more overlapping sclerotic bony plates surrounding the pupil, as in birds. This circle acted as a sort of self-adjusting telescope, and, accompanied by the extraordinary amount of light admitted by the large pupil, enabled the ichthyosaurus to discover its prey at great or little distances in the obscurity of the night, and in the depths of the sea. The neck was so short that the body was probably not in the least constricted behind the head. The backbone was fish like; each joint had both its surfaces hollow, making the whole column very flexible. The small size of the paddles compared with the body, and the stiffness of the short neck, seem to suggest that the tail must have been an important organ of motion. Prof. Owen is satisfied that it was furnished with a vertical tail, because the vertebræ are compressed vertically, and also because the tail is frequently found disarticulated a short distance from its extremity, as if the weight of the upright tail had caused it to fall when the animal had begun to decompose. The fish-like body, the four paddles, and especially the powerful tail, would make the ichthyosauri active in their movements; and consequently, with their predaceous habits, very dangerous enemies to the other animals that inhabited with them the secondary seas. That their principal food consisted of fishes, is evident from the masses of broken bones and scales of contemporary fishes that have been found under their ribs in the place where the stomach of the animal was situated.

The remains of ichthyosauri are peculiar to the secondary strata, occurring in the various members of the series from the lower lias to the chalk, but having their greatest development in the Lias and oolite. More than 30 species have been discovered; they differ from each other chiefly in the form of the head, some having a long and slender snout, like the gavial of the Ganges, while others had short and broad heads, more like the common crocodile.

The great repository for ichthyosaurian remains hitherto has been the lias at Lyme Regis.

ICHTHYOSIS, or FISH-SKIN DISEASE, is characterized by a hardened, thickened, rough, and almost horny state of the cuticle, which breaks into small, irregular, scale-like pieces, which do not readily exfoliate, but which, if removed, are speedily reproduced. The disease may affect almost the whole surface, or may be confined to a single part; and is most frequently, but not always, congenital. It is attended with no constitutional disturbance, and the general health is often very good. The disease is, however, extremely obstinate, and when congenital, may be considered as incurable.

The treatment consists in the frequent use of the warm or vapor bath, so as to soften the thickened epidermis and to facilitate its removal, and friction by means of a piece of flannel may be conjoined with the bath. The employment of sulphureous baths, such as those at Harrogate, has occasionally been found of temporary use; and the internal administration of tar, cod-liver oil, etc., sometimes gives relief.

ICICA, a genus of trees of the natural order *amyridaceæ*, having pinnate leaves with an odd terminal leaflet, and white flowers in panicled racemes: the flowers having a small 5-toothed calyx, 5 petals, 10 stamens, and a cup-shaped disk with 10 crenatures on the margin, the fruit a drupe.—*I. icicariba* yields the American elemi (q.v.).—*I. heterophylla*, a tree of Guiana, yields a yellow aromatic balsam, which long retains its fluidity, and is used as an application to wounds. The resinous seeds are very fragrant.—*I. heptaphylla* and *I. Guianensis*, also natives of Guiana, yield very fragrant balsams, which harden into a gray resin, used as incense in churches and for other purposes, and esteemed useful as a medicine in dysentery.—*I. altissima* is a tree 100 ft. high, a native of Guiana, of which the wood is known as *white cedar* and *red cedar*, and as *acuyori*, *Samaria*, *mara*, and *curana wood*, is used for furniture and house-carpentry and for canoes.

I'CICLES, in heraldry, are charges of the same shape as drops in the bearing called gutté (q.v.), but reversed. They have also been called clubs, locks of hair, and guttés reversed.

ICIL'IUS, the name of a plebeian family in Rome, which produced some of the most zealous defenders of the plebeian interest against the patricians. The name of one of them is associated with one of the most touching incidents in the legendary history of Rome. See APPIUS CLAUDIUS.

I'CO, a t. of Brazil, in the province of Ceara, on the Salgado, 210 m. n.w. of Parahiba. The greater part of the inhabitants are shopkeepers, who supply the interior with articles of European manufacture, receiving produce in return, which they send down to the coast. Pop. 6,000.

ICOD', or ICOD DE LOS VINOS, a small t. on the n.w. coast of Teneriffe, one of the Canaries (q.v.). Pop. about 5,500.

ICOLMKILL'. See IONA.

ICO'NIUM. See KONIEH.

ICONOCLASTS (Gr. *eikon*, image, and *klazo*, I break), the name used to designate those in the church, from the 8th c. downwards, who have been opposed to the use of sacred images—that is, of statues, pictures, and other sensible representations of sacred objects—or at least to the paying of religious honor or reverence to such representations. The iconoclast movement had its commencement in the eastern church. Opinion is divided as to the origin and antiquity of the practice of image-worship (q.v.) in the church; but it is certain that in the 6th and 7th centuries it prevailed extensively, especially in the eastern empire, and that practices existed in some churches which were a source of much suspicion, and even of positive offense. Many bishops interposed to correct these abuses; but the iconoclast movement, strictly so called, began with the imperial edict issued in 726 by the emperor Leo III., surnamed the Isaurian, forbidding the honors paid to sacred images, and even commanding the removal from the churches of all images, that of our Lord alone excepted. This was followed by another decree in 730, which prohibited, under pain of death, as sinful and idolatrous, all acts of reverence, public or private, to images, and directed that, wherever such images should be found, they should forthwith be removed or destroyed. The attempt to enforce this decree occasioned great agitation, especially in the Greek islands and in Italy. The popes Gregory II. and Gregory III. protested vehemently against it, repudiated the imputation of idolatry, and explained the nature of the honors to images for which they contended. Leo persevered, nevertheless, in his opposition, which was continued by his successor, Constantine, surnamed Copronymus. Under this emperor a council was held in Constantinople in 754, in which the iconoclast decrees were affirmed in their fullest extent, and Constantine's son, Leo IV., renewed, on his accession in 773, the enactments of his predecessors. Under the widow of Leo, the empress Irene, a council was held at Nice, 786 (see IMAGE-WORSHIP), in which these proceedings were condemned and revoked; but other succeeding emperors, Nicephorus (802–811), Leo the Armenian (813–820), Michael the stammerer, and Theophilus, returned, with greater or less severity, to the policy of the iconoclast emperors. As regards the Greek church, the controversy may be said to have been finally settled under the empress Theodora in a council held at Constantinople in 840, or at least by a subsequent one of 870. The modern usage of the Greek church permits pictures, but rejects graven or sculptured representations of sacred objects. Except in Italy, the iconoclast controversy created but little sensation in the western church until the movement in the time of Charlemagne and his successors, which will be noticed under IMAGE-WORSHIP.

In the modern church, the popular violences directed in Switzerland, Great Britain, and some parts of Germany, against crucifixes, images of saints, and other objects associated with what has been stigmatized as the idolatry of Rome, have sometimes been described under the name of iconoclasm.

ICTINUS, a contemporary of Pericles. He was the chief architect of the Parthenon of Athens, 438 B.C., the temple of Epicurius in Arcadia, and the Eleusinian temple.

ICY CAPE, a headland of North America, is in 71° n. lat., about the middle of that long reach of the arctic coast between cape Lisburne on the s.w., and cape North or

Point Barrow on the n.e. It was discovered by Cook in 1778, and was his furthest point n. of Behring's strait.

IDA, a high mountain range, in Asia Minor, extending from Phrygia through Mysia into Troas. The city of Troy was situated at its base. It is the scene of many ancient legends. The southern part of the range was called Gargarus, the highest peak of which is about 4,700 ft. above the sea. Here there was a temple of Cybele, who therefore was called the *Idæan Mother*. From Ida flow several famous streams, as the Granicus, Simois, and Scamander.—There is another Ida in Crete, extending from w. to e., and now called Psiloriti. On this Ida, according to an ancient legend, Zeus was educated.

IDA, a co. in w. Iowa; 432 sq.m.; pop. '70, 226. Its soil is very fertile. Staple products: grain, potatoes, and sorghum. Capital, New Ida.

IDAHO, a n.w. territory of the United States, bounded n. by British America, e. by Montana and Wyoming, s. by Utah and Nevada, and w. by Oregon and Washington. Area 86,294 sq. miles. The surface is generally elevated, and the soil capable of high cultivation. Agriculture, however, has been little prosecuted; and the main source of the wealth of the territory consists in its gold, silver, and other minerals. Pop. '70, 14,999. Capital, Boisé City. Organized as a territory in 1863, Idaho was afterwards diminished in area by the abstraction of Montana to form a separate territory.

IDAHO (*ante*), a mountainous territory of the United States on the Pacific slope of the Rocky mountains, embracing many of the sources of the Columbia river; between lat. 42° and 49° n., and lon. 111° and 117° 10′ w.; bounded n. by British Columbia, which it touches only by a narrow strip, w. by Oregon and Washington territory, e. by Montana and Wyoming territories, and s. by Utah and Nevada. The e. line is irregular, following most of the way the course of the Rocky and Bitter Root mountains, so that the breadth of the territory, which is nearly 300 m. on the s., is less than 50 m. on the north. The length of the territory from n. to s. is nearly 500 miles. Its area embraces 86,294 sq.m., or 55,228,160 acres, of which only 16,925,000 acres are suited for agriculture, and 5,000,000 for grazing; over 14,000,000 acres which are now sterile might be reclaimed by irrigation. The mountain, timber, and mineral lands cover an area of 33,900,000 acres; the lakes 575,000 acres. Its arable portions are chiefly found in the river valleys and around the lakes; and even many of the valleys, notably the upper valley of the Salmon river, lie at so great an elevation, and surrounded by such a breadth of lofty snow-capped mountains, that the season between severe frosts is too short to permit much development of agriculture.

The mountain system of Idaho is peculiar, and its central uplifts are too separate, extensive, and lofty to be ranked as mere spurs of the Rocky mountain chain. The Salmon river range, which occupies the central part of the territory, a portion of which, near the sources of that great river, is known as the Saw-tooth range, is one of the most picturesque and lofty ranges of America. It covers an area as large as the state of New Jersey. The Snake or Shoshone river valley encircles it e., s., and w., and the Salmon river, w. of Salmon City, on the north. The following large tributaries of the Snake river all have their sources within a few miles from the junction of lat. 44° with long. 114° 30′, viz.: the Salmon, flowing n.n.w.; the Wood river, flowing s.s.e.; the Little Wood, in the same direction; the Lost river, s.e.; the e. fork of the Salmon, n.e.; and the sources of the three forks of the Boisé river, s.w. It is thus seen that the streams radiate to nearly every point of the compass from this lofty central range, yet all flow into Snake river at last. The government not yet having made a survey of this part of the territory, no map yet published (1880) gives any correct impressions of the sources or directions of the streams which flow from it. The Salmon mountains, like the Alps, are apparently without system or parallelism, and broken into a score of disjointed ranges, through which streams flow in all directions, in tortuous valleys, with intricate exits and entrances. The Wood and Salmon rivers, however, divide these mountain masses into two nearly equal parts by their valleys; Idaho having, as above indicated, a generally n.n.w. direction. The point where the two valleys head is known as the Wood river pass; is nearly 9,000 ft. high, but quite practicable for the construction of either wagon or rail road; while both valleys, to within a few miles of the summit of the pass, are easy planes for roads. These valleys and this pass are therefore the natural passage-way into the heart of Idaho. A road is just completed up the Wind river valley to within a few miles of the summit of the pass, and will probably be continued over the pass and down the valley of the Salmon to the Yankee fork before this description reaches the eye of the reader. It is at the sources of the streams that flow into these two valleys that extensive discoveries of silver and lead quartz veins, and some gold, have recently been made. The loftier parts of these mountains are generally granite or gneiss, but limestone belts are frequent, especially in the Wind river valley, and outcrops of slaty rock are found in many places.

In the northern part of the territory the Bitter-root, Kootenay, Cœur d'Alêne, and Clearwater mountains may be considered as spurs of the Rocky mountain range, while the Bear river ranges in the s.e. part of the territory form connecting links between the main continental divide and the Wasatch range. The crests and summits of the Salmon river mountains, and those of the n.w. part of the territory, range from 10,000 to

13,000 ft. above the sea; those of the s.e. are somewhat lower. The most remarkable feature of Idaho connected with its mountain system is the vast lava bed which covers the whole of the territory on the s.e. and s. along the course of the Snake river; forming a desert 400 m. long, mostly on the n. side of the river, varying in width from 40 to 60 m., and exhibiting over a considerable part of that area the black and ragged character of a recent volcanic eruption. It is the eastern end of a vast volcanic belt extending westerly to the Pacific; and of the same character as the lava beds in which capt. Jack with his Indian warriors long evaded the U. S. troops in California. The volcanic craters from which all this sea of lava has been poured out are plainly indicated by the planes of the flows, though the craters themselves are generally inconspicuous among the mountains that bound the lava on the north. W.n.w from fort Hall and Blackfoot station, on the Utah and Northern railway, are the Three Buttes, known since the first migration to the Pacific coast as landmarks on the great emigrant route which traversed this lava field near them to reach the foot-hills of the Salmon river mountains. These buttes rise, isolated, out of the lava plain, and have been volcanoes. The middle one, however, was last to spread its molten streams on every side, as proved by the descending planes of lava. It is probable that the whole northerly side of this volcanic belt was dotted with craters when the lava deposit took place, but they are now recognizable in a few places only, where last in action. After covering the great plain the lava flowed backward into the mouths of the valleys between the foot-hills on the n., so that nearly all the streams that flow e. and s.e. are dammed by the lava, and sink into its porous masses, flowing under it, to reappear after a subterranean passage from 30 to 50 m. as springs and cascades issuing from the basaltic walls of Snake river. The most rugged portion of this desert lies near the foot-hills on its northern edge. On the line of its back-flow to these hills, and up their valleys, the old emigrant road was forced to make its tortuous windings to avoid the rough lava. The lower portions of the plain nearer the Snake river, either by reason of greater age and disintegration, or by alluvial deposits upon it, are covered with soil upon which the sage-brush flourishes, and which needs only irrigation to be productive of whatever crops its elevation above the sea will permit.

Rivers.—The Snake or Shoshone river, or Lewis fork of the Columbia, with its branches, drains all the territory except the far n. and the s.e. portions. The Bear river, which flows into Great Salt lake, drains and waters a portion of the territory that admits of considerable agricultural development. The Snake rises in the main Rocky mountain range in Wyoming, entering Idaho on a n.e. course, then comes to the s. and by an irregular semicircle flows s.w., w., n.w., and n., where it divides the territory from Oregon; and thence turns westward to join the Columbia. Steamers ascend from its mouth to Lewiston, and it is navigable also from the mouth of Powder river to Salmon falls, a distance of 200 miles. It traverses a course of 850 m. in Idaho alone. Its chief tributaries from the n. side, in the territory, are the Clearwater, the Salmon, the Weiser, the Payette, the Boisé, and the Malade or Wood rivers; from the s. the Owyhee river, and a large number of smaller streams. The river from its entrance into the territory down to the falls at its southern curve is generally deep, narrow, and rapid, and can be used to irrigate large areas of adjacent lands now desert for lack of water. Below the falls it cuts deep through beds of lava and rock. Three falls in the river deserve notice. The American falls have a perpendicular descent of 60 or 70 feet. The Shoshone falls are inferior only to those of the Niagara and the Yosemite. The river here is 600 ft. wide. Above the falls it is divided by five islands into six parts, and then, after flowing 400 yards further, it passes in an unbroken sheet over a precipice, making a perpendicular descent of 200 feet. At some seasons of the year the body of water is almost equal to that at Niagara. The surrounding scenery is magnificent. The Salmon falls, 45 m. below the Shoshone, are 20 ft. high. There are numerous other waterfalls in the territory, some of which are of greater height than those above named, though the body of water is smaller. The valleys of the tributary streams are from 3,000 to 6,000 ft. above the sea, and some of them are from 10 to 15 m. wide. The Salmon river drains a large part of the central mountains of Idaho, and flows from its source s. of lat. 44, first n.n.w., then turns due e., where it receives the Yankee fork, a small stream recently made famous by great mines, and after flowing about 50 m. e., runs n. and finally w. to the Snake. Its head-streams are numerous, and formed directly from the snows of lofty mountain ranges, so that the river is a considerable stream near its source, there flowing through a valley of rare beauty, though too elevated to have value as grazing or agricultural land. At every part of its course it is fed by mountain streams. The Boisé river is made by the junction of the North, Middle, and South forks, which flow s.w. from the Saw-tooth range of the Salmon-river mountains and drop down from their sources to valleys of lower level than those of other parts of the territory; so that the s.w. part of the territory and the valley of the Boisé river are the warmest, and most varied in agricultural products. Fruits and vegetables of all kinds grown in the northern states flourish there. The Weiser and Payette rivers are chiefly noted for having been the theater of some of the most successful gold placer diggings ever known. The Wood river, known where it enters the Snake as the Malade, flows southerly from sources in lat. 44° in the Salmon-river mountains. Where it issues from the mountains on the northern edge of the lava

plain its detritus widens into a plain of 20,000 or more acres 5,700 ft. above the sea, which the river might be made to irrigate. The river above this descends through a narrow valley by an easy plane from its source in the pass at the head of the Salmon river. The Lemhi, the most easterly tributary of the Salmon, joins it at Salmon city, and is fed by short streams directly from the main divide of the Rocky mountains. The Clearwater is the main stream in the northern part of the territory, also known for its gold-washings. Three long narrow lakes furnish a peculiar navigation for the extreme northern part of the territory. These are the *Cœur d'Aléne*, about 18 m. long and 2 m. wide, emptying by the Spokane river into the Columbia; lake *Pend d'Oreilles*, really a wide part of Clarke's fork of the Columbia river, about 30 m. long and 2 to 6 m. wide; and lake Kanisku, flowing into Clarke's fork from the mouth. These lakes are bordered by a country rich in timber, especially a large growth of red cedar.

The climate of Idaho is somewhat varied, though generally delightful during the summer and autumn. The winters in the high mountains are extremely cold, with deep snows; but in the lower valleys and plains cattle sometimes winter without shelter. In the w. part of the territory the temperature is not very different from that of central Illinois; in the e. portion it is more like that of the n. part of New England, while in the high valleys of the mountains snows rest till June. Idaho was organized as a territory by congress in 1863, but with an area more than three times as large as that embraced within its present boundaries, having included the whole of Montana and nearly all of Wyoming. It was a part of the Louisiana purchase of 1803, and formed successively a part of Oregon and Washington territories. It was first explored by Lewis and Clarke, at the beginning of the present c., previous to which time it is supposed that no white man ever set foot thereon. After that it was traversed only by hunters and trappers until 1852, when gold was discovered near the northern boundary. The total population of the territory in 1870 was 20,583, of whom 5,631 were Indians, 4,274 were Chinese, and 60 were negroes. There is no record of the population at an earlier date. Of the population forming the basis of representation (14,999), 12,184 were males, 2,815 females—7,114 native, and 7,885 foreign born. The number of families was 4,104, of dwellings 4,622. The principal tribes of Indians were the Nez Percés, 2,807 in number, living on a reservation of 1,344,000 acres in the northern portion of the territory; the Shoshones, numbering 516, and the Bannocks, 521, living on a reservation of 1,568,000 acres in the s.e. part of the territory, and about 2,000 of other tribes, on a reservation of 266,000 acres n. of that of the Nez Percés.

Mines and Mining.—Gold, silver and lead are found near the sources of nearly every river in Idaho. Gold was first discovered in 1852 on the *Pend d'Oreilles* river, but not in paying quantities till 1860, when it was washed with profit on the s. fork of Clearwater river. In 1862 valuable gold-bearing deposits were found in the streams that form the Boisé river; the following year, in the tributaries of the Owyhee river; and subsequently exceedingly rich "finds" were worked in the valleys of the Weiser and Payette. This region, better known as the Boisé basin, proved one of the richest placer gold-fields ever found. These and other valleys in the territory are estimated by J. Ross Brown in a report to the government to have produced prior to 1868 $45,000,000 of the precious metals, nearly all gold. Rossiter W. Raymond, who brings the estimate down to 1873 inclusive, gives the product of 1868, $7,000,000; 1869, $7,000,000; 1870, $6,000,000; 1871, $5,000,000; 1872, $2,695,870; 1873, $2,500,000: making upwards of $75,000,000 as the total product of the precious metals in Idaho down to 1874. A U. S. assay office was established at Boisé city, the capital, in 1872. From the time of the exhaustion of the gold-washings of western Idaho, the mountains of every part of the territory have been searched for silver- and gold-quartz mines. In the Owyhee valley and Boisé basin many silver-mines have been worked with profit since 1872, but the difficulty of getting provisions and machinery into the mountains on the n. side of the lava-belt has seriously impeded their profitable development. In 1875–76 very valuable silver- and gold-quartz ledges were discovered on the tributaries of the Salmon river s. w. of Salmon city, the most famous of which are on Yankee fork, where Bonanza city has sprung up. The Custer mine there is remarkable for exhibiting the greatest mass of ore on the surface ever discovered. On that mine alone $200,000 were expended in 1880 to complete and stock one stamp-mill. In 1878 rich surface-ores were found on the s. sources of the Salmon river in the Saw-tooth mountains, and mines are now being developed there. The excitement caused by that discovery led, the following year, to the exploration of all the mountains about the sources of the Salmon and Wood rivers, in which previous to that year the Indians had been feared. These explorations led to the discovery of a great number of valuable mines of silver and galena ores, especially in the tributaries of Wood river; to which wagon-roads are now (1880) being made, and which promise to secure the construction of a railway across the lava desert to the valley of the river. Four villages sprang up in those high valleys in 1880 where two years before no sound of white settler had ever been heard.

Vegetation.—The forests of Idaho are confined to the n.w. part, and to the sheltered valleys of the mountains. Noble pines, spruces, and cedars abound in the n. and in the upper valleys of the Salmon-river mountains. Trees of these species, large enough for any timber that is needed, are found here and there in all the high mountain valleys. The red cedar of Kootenay and Shoshone counties is of larger size and in greater abundance

than is found elsewhere in the world. In the Boisé basins, on the w. slope of the Saw-tooth range, groves of the lofty Oregon long-leaved pine abound, which attains a height of 120 to 170 ft., a diameter of 4 to 7 ft., and serves for saw-logs almost to the summit. On the e. side of the same mountain the Norway spruce and the red pine attain a diameter of 3 to 5 feet. Other pines and firs furnish an abundance of small timber there. The country e. of the Salmon and Wood rivers is meagerly timbered, and below an altitude of 6,000 ft., except the deciduous growth that fringes the streams, trees are rarely seen. Willows, poplars, and the ash-leaved maple are the principal trees at the streams. Compared with the eastern states, the vegetable growth of Idaho is extremely meager. Wild fruits are very rare in most parts of the territory. Cultivated fruits and vegetables are grown with profit in many places, but more in consequence of the high prices they command than the ease or certainty of production; though in the s.w. part there are valleys where the climate admits of a profitable culture at low prices. The Boise basin is exceptionally noted for its fruits and vegetables. For grains only a small portion of the territory is adapted, yet there are broad stretches of land on both sides of the Snake river and in the valleys of its tributaries where irrigation would produce the same results in making crops of wheat, oats, and rye as it has done in Utah; and there are small tracts here and there throughout the territory where these crops can be grown without irrigation.

Of grazing-lands there are considerable tracts in the aggregate, but so scattered among mountain valleys that only a settlement of the state by the development of its mines will make the small valleys valuable. All along the n. side of the lava-belt the foot-hills and the Camus prairies furnish the thousands of cattle that pass eastward over the old emigrant road enough to live on as they travel. It is estimated that 150,000 head of cattle passed along that road in 1880. This indicates a high value for grazing during the summer; but the snow-fall at the elevation of about 6,000 feet necessitates winter feed for cattle. Along the Snake river, on both sides, there are numerous spots and valleys of grazing-lands where winters are not severe enough to prevent cattle and horses from picking up a living for themselves. Herders and packers who use mules and horses in the northern mountains through the summer season withdraw to the valley of the Snake river to winter their stock. In the n. part of the territory it is not so much the severity of the winter as the depth of the snow and shortness of the summer season that makes stock-raising of little account there.

Climate.—There is but little rain-fall in any part of southern Idaho. Towards the center the lofty mountains command a heavy snow-fall during 8 months of the year, and rob the plains of the precipitation of rain which their elevated ranges arrest. In the n.e. part the rain- and snow-fall is more equally distributed between mountain and valley. The climate of Idaho is so dependent on the elevation of its different parts that one must name each part to be described. Along the Snake river, and northward from it to the foot-hills of the Salmon and Rocky mountains, is a dry area of almost torrid heat under the sun from May till Nov.; yet the nights are always cool, and the air healthy and invigorating. The same hot sunny days are found up the lower valleys among the mountains, but there the nights are still cooler, and the warm season begins later and closes earlier. On the mountain-crests the snow frequently lies all summer, and ice forms almost every night; but even at those heights in the autumn the soil is perfectly dry to within a few feet of the melting snow. The winters are quite variable both on the plains and in the mountains, the winter variations from one year to another being greater than the summer. The thermometrical and barometrical ranges in Idaho have not been recorded to an extent that warrants any deduction or furnishes any valuable tables of reference. At fort Hall, in the s.e. part of the state, 4,754 ft. above the sea, the barometric range in 1871 from June to Oct. was but $\frac{24}{100}$ of an inch; the mean temperature for June was 64.62° F.; of July, 70.44°; of Aug., 70.90°; of Sept., 57.29°; and of the first 18 days of Oct., 57.28°.

The wild animals of the territory include the grizzly, the cinnamon or bald-face, and the black bear, the mountain lion (a large species of panther), wolf, cayote, wildcat, raccoon, badger, fox, beaver, sable, mink, otter, skunk, gopher, squirrels, rabbit, buffalo or bison, elk, moose, mountain sheep, wild goat, and antelope. Yet of all this variety no one species abounds except in the Boisé basin. The birds are not very numerous nor of great variety; the different species of grouse being the most abundant of the game birds. Snakes, numerous in the lava belt, are rarely seen above an altitude of 6,000 feet. Many of the same species of fish are found as in the streams of the eastern states; but the variety is not so great. The great fish of the territory is the salmon, which comes up from the Columbia river in immense numbers to spawn in the Salmon and other rivers, where it attains great size, sometimes from 40 to 60 pounds. Bears stand on the margins of streams and lakes where they abound, and by a quick motion of the paw kill the salmon as they pass in the water below. Salmon fishing and packing is one of the considerable industries of the territory, and the name salmon-eater is a term of ridicule applied by miners to those who live by fishing. In a few of the interior lakes of the Saw-tooth range of mountains the red-fish is found. This is one of the rarest and perhaps the most beautiful fish in the world. Humboldt stated that in his time they were known to exist in but five lakes in the world. They have since been discovered in the Idaho lakes. It is a fish that reaches a weight of 4 or 6 lbs., but

usually about 3 pounds It is supposed to exist only where chlorine is a constituent of the water. Its anatomy and habits differ from those of any other fish. It comes to the creeks in Aug. and Sept. to spawn, and is believed to remain near the bottoms of the mountain lakes at other seasons. When these fish first appear the meat is much prized, being fat and of fine flavor; but later they become less eatable. They are caught and salted in considerable numbers in the lakes of the Saw-tooth range w. of the Salmon river.

Some interesting fossils have been found, embracing remains of the mastodon, elephant, and tapir families, of bears and monkeys, of crocodiles, alligators, and other saurians, and of genera allied to the horse. The records of the Hayden expedition are rich in details of the botany, geology, and zoology of the territory.

The census of 1870 showed 77,139 acres of farms, of which 26,603 were under tillage. The assessed value of the property for taxation in 1876 was $4,381,227. The taxes levied for the same year, $114,198. The debt of the territory was $127,993. In 1870 there were in the territory 101 manufacturing establishments, with a capital of $742,300, and disbursing in wages annually $112,372. The annual product of these establishments, which were mostly gold and silver smelting furnaces, was valued at $1,047,624. There was one national bank at Boisé city in 1870, with a capital of $100,000; there were also several private banks in the territory. The schools of Idaho, like those of all sparsely settled communities with a heterogeneous population, are feeble and inefficient, though no more so than might be expected. The whole number of children of school age in the territory in 1875 was 3,852; the number attending school, 2,093. In 1876 the number in attendance was 2,724. Receipts for school purposes in that year, $36,215.42; expenditures, $16,590.55. The reports, however, are far from complete. Some of the schools were flourishing, and there is no lack of an intelligent public spirit to make them good in time.

The territory has but one railway, the Utah and Northern, a narrow gauge, on its eastern border, entering via the Bear river valley, coming to the Snake river at Blackfoot, crossing it at Eagle rock, traversing the lava fields n. to Pleasant valley, and thence up the Rocky mountain divide into Montana. Nearly the entire line in Idaho was built in 1878–79; and the profits of business that accumulated upon it in its progress almost built the road. A branch to the Yellow Stone park is under construction from Pleasant valley on this road. The Utah and Northern railway is owned by the Union Pacific railway company. Surveys have been made from this road at Port Neuf river and from Blackfoot westward across the lava beds to the Wood river and thence to Boisé city; also from Ogden up to the Snake river, on several lines designed to try the route of the Snake river s. of the lava field for a road to Oregon. Some one of these routes will be chosen the coming year (1881) by the Union Pacific company, and work prosecuted on it. The Central Pacific company are also contemplating the construction of a branch from Kelton, or near it, across the lava plain to the mining camps of the Wood and Salmon valleys. The recent development of mines in the interior of Idaho has stimulated the construction of wagon roads and trails; but the territory is in its infancy in this kind of work and needs the help of the government to give access to its mountain heart by roads of a better character than the poor miners can make for themselves. A movement of great value to the miners in its mountain recesses has recently been made for the purpose of encouraging the making of toll trails for mules and horses, which can be made at slight expense at elevations on the mountain sides where wagon roads would cost more than the returns from them would warrant.

Government.—Boisé city is the capital. The governor and secretary of the state, the surveyor-general, U. S. district attorney and marshal, register of land-office, and receiver, are appointed for four years by the president; the comptroller, treasurer, and superintendent of public instruction, are elected. The legistature has a council or senate of 13 members, chosen for two years, and a house of representatives of 25 members, chosen for one year. The U. S. court for the territory consists of a chief justice, two associate judges, clerk, district attorney, and marshal. There is one delegate to congress. The territory is divided into ten counties.

IDAHO, a w. co. of Idaho territory, extending from Oregon to Montana. It is watered by the Little Salmon and other streams. Much of it is mountainous, but there are fertile valleys, especially the Payette valley, producing grain, grass, maize, and cattle. Game and fish abound. Pop. '70, 849.

IDA'LIUM, a promontory of Cyprus, on which was a famous temple of Venus, whence the goddess was sometimes called *Idalia*. The modern name is Dali or Dalin.

IDE, *Leuciscus idus*, a fish of the family *cyprinidæ*, of the same genus with the roach, dace, chub, etc. It is a native of the lakes of the northern parts of Europe, ascending rivers in April and May to spawn. The ide is one of those fishes which it seems both easy and desirable to introduce into British waters.

IDE, GEORGE BARTON, D.D.; 1806–72; b. Vt.; graduated at Middlebury college 1830, and was pastor of prominent Baptist churches in Albany, Boston, Philadelphia, and Springfield, Mass., 42 years. He was distinguished for eloquence and erudition. Several of his sermons were published.

IDEA. This word has borne very distinct meanings in the history of philosophy. Down to the 17th c., it had the signification given to it by Plato, and referred to the Platonic doctrine of eternal forms existing in the Divine mind, according to which the world and all sensible things were framed. Plato made a grand distinction between the *intelligible*, or what occupied the intellect, and the *sensible;* the one represented the eternal, the immutable, and the certain; the other, the mutable and fleeting part of the universe. The forms preceded the matter; the actual circles occurring in nature were produced from a pre-existing ideal circle holding a place in the Divine intelligence; the actual men were generated from an ideal man. The word was used in this sense in literature as well as in philosophy down to the 17th c., as in Spenser, Shakespeare, Hooker, and Milton. Thus in *Paradise Lost*—

> God saw his works were good,
> Answering his fair *idea.*

Sir W. Hamilton dates the change that came over the application of the word from the publication of Descartes's *Discourse on Method* in 1637, remarking, however, that in a treatise by David Buchanan, published at Paris the year before, the new meaning had been introduced. "The fortune of this word is curious. Employed by Plato to express the real forms of the intelligible world, in lofty contrast to the unreal images of the sensible, it was lowered by Descartes, who extended it to the objects of our consciousness in general. When, after Gassendi, the school of Condillac had analyzed our highest faculties into our lowest, the *idea* was still more deeply degraded from its high original. Like a fallen angel, it was relegated from the sphere of Divine intelligence to the atmosphere of human sense; till at last *ideologie* (more correctly idealogie), a word which could only *properly* suggest an *à priori* scheme, deducing our knowledge from the intellect, has in France become the name peculiarly distinctive of that philosophy of mind which exclusively derives our knowledge from the senses."—Hamilton's *Discussions*, p. 70.

In speaking of the mental representation of external things, Descartes, instead of employing the various terms *image*, *species*, *phantasm*, etc., which had been the words formerly in use for that particular signification, used the word idea. In this he was followed by other philosophers, as, for example, Locke, who states that he has adopted the word to stand for "whatever is the object of the understanding, when a man thinks." Thus the mental impression that we are supposed to have when thinking of the sun without seeing the actual object, is called our idea of the sun. The idea is thus in contrast with the sensation, or the feeling that we have when the senses are engaged directly or immediately upon the thing itself. The sensation is what constitutes the *thing*, the reality: the impression persisting after the thing has gone, and recoverable by mental causes without the original, is the idea. Although the word in this application may be so guarded as to lead to no bad consequences, Dr. Reid was of opinion that it gave countenance to the setting up of a new and fictitious element in the operations of the mind. This, however, raises the great question of metaphysics—namely, the exact nature of our knowledge of an external world. See PERCEPTION.

It is difficult to avoid the use of the word idea, and yet, owing to the looseness of its application, there is a danger of its not conveying a definite signification. We need a general word to express the contrast to sensation, or to actuality; and no better term has yet been found than idea, being what is common to memory and to imagination, and expressing the mind as not under the present impression of real objects, but as, by its own tenacity and associating powers, having those objects to all practical ends before its view. Thus, all our sensations, whether of sight, hearing, touch, taste, or smell, and all the feelings that we have in the exercise of our moving energies, become transformed into ideas when, without the real presence of the original agency, we can deal with them in the way of pursuit or avoidance, or can discriminate and compare them, nearly as if in their first condition as sensation. Sir W. Hamilton, in his *Lectures on Logic* (i. 126), has endeavored to avoid employing the word, but other writers on mental philosophy have freely adopted it in the above acceptation. See also GENERALIZATION and IMAGINATION.

IDEALISM (IDEA, *ante*), as the term is generally used, is that scheme of philosophy which, carried to its legitimate results as was done by bishop Berkeley, regards all external phenomena as having no existence apart from a thinking subject. Descartes and his followers taught that nature has given to the mind various simple ideas, with the capacity also of compounding, separating, associating, and comparing them. The tendency of this theory is towards skepticism concerning everything except the existence of ideas. If they be the only objects of thought, and have no existence except when the mind is conscious of them, then no object of thought can have a continued and permanent existence. Bishop Berkeley, evading this consequence in regard to the existence of mind and spirit, asserted it concerning the material world. He maintained that there is no such thing as matter in the universe; that sun and moon, earth and sea, our own bodies and those of our friends, being only ideas in the minds of those who think of them, have no existence when not objects of thought; and that the universe may be reduced to two categories—minds, and ideas in the mind. To this conclusion philosophers before him had led the way. Descartes taught that the existence of objects of sense is not self-evident, but must be proved by argument. Others tried to find

arguments that would prove it, but without entire success; all their reasoning being, in the opinion of many, sufficient only to show that the existence of external things was probable but not certain. Malebranche rested the question on the authority of revelation; but to this the reply was that revelation itself can come to men only through their senses. Berkeley thought that if his theory were admitted many difficulties would be solved, many intricate points made plain, and skepticism brought to an end. But the actual result of his system was very different. By seeming to throw distrust on the evidence of the senses and to take away the grounds of a belief which is both natural and universal, its tendency was to shake men's faith in the primary truths which are the basis of their knowledge and the guides of their conduct. Beginning where Berkeley began, Hume went much further, and left hardly one article of human faith unassailed. He denied the reality not only of the object perceived, but of the mind perceiving; and reduced all thinking existence to a succession of rapidly fleeting ideas, each one being known only at the instant of its manifestation to consciousness, and then fading away. He maintained that men do not know that any one thing depends on any other in the relation of an effect to its cause; and the conclusion at which his reasoning aimed was not the mere negation of this or that positive belief, but universal distrust of the human faculties as a means for the acquisition of knowledge. They contradict each other, he said, and leave nothing certain except that nothing can be known as certain.

Idealism has indeed its interwoven truth, but it is a truth misapprehended and perverted. There are impressions, inferences, and imaginations, mingling, naturally or inadvertently, lawfully or unlawfully, with all genuine knowledge. These the ideal philosophy confounds, instead of distinguishing them in theory as common sense does in practice. As a system its radical vice is that while it admits the reality of certain objects, as mind and spirit, it inconsistently maintains that certain other things, as those of the material universe, which the mind just as intuitively knows to be real, are not real. It commonly begins by declaring that external objects have no such reality as men generally suppose them to have; advancing, from this point, to the denial that they have any reality at all, it still makes pretensions to a realism founded, not on the external phenomenon, but on the internal idea. From this refuge also logical necessity drives it away and forces it to assert that *self* is not as it seems, or that it exists only as it is felt, or when it is felt, and that men cannot know whether there be objects before them or not, or whether there be an eye or a mind to perceive them. There is no way of avoiding blank skepticism except by standing up for the trustworthiness of all the original intuitions of the human mind and affirming that there is a reality whenever those intuitions, taken comprehensively, actually declare that there is. If the mind can trust the faculties God has given it, it does perceive matter objectively; that is, something extended and solid is the immediate object of touch and sight; and this something is not in itself an idea, but matter.

IDELER, CHRISTIAN LUDWIG, an eminent astronomer and chronologist, was b. Sept. 21, 1766, at Gross-Brese, near Perleberg, in Prussia, and, after holding various offices, received a professorship at the university of Berlin in 1821. He d. Aug. 10, 1846. Ideler's most important works are, *Historische Untersuchungen über die Astronomischen Beobachtungen der Alten* (Leip. 1806); *Untersuchung über den Ursprung und die Bedeutung der Sternnamen* (Berlin, 1809); *Handbuch der Mathematischen und Technischen Chronologie* (2 vols., Berlin, 1825–26), the last of which was the first work that presented a clear view of the reckoning of time among the ancients; and *Die Zeitrechnung der Chinesen* (Berlin, 1839).

IDEM SONANS, a term sometimes used in English law, where a mistake as to a surname is made in a legal document, to denote that the name used by a mistake was of a similar sound, in which case the mistake is generally treated as immaterial.

IDENTITY of person in point of law must often be proved in legal proceedings, as in proving a marriage, proving a pedigree, proving a thief, etc. The usual proof is the oath of some one who knew or was cognizant of the facts at both the times referred to. A favorite defense of thieves and persons accused of crime is that it is a case of mistaken identity, in which case the prisoner must generally establish an *alibi*—i. e., that he was in some other place at the time in question.

IDENTITY, CONTRADICTION, AND EXCLUDED MIDDLE. It has been common to look upon some truths as necessary, in opposition to others that, although certain to all intents and purposes, are not necessary, but *contingent*. Thus, it is considered a necessary truth, that two straight lines cannot inclose a space; that the less cannot include the greater, that a man cannot be in two places at the same time. On the other hand, it is not necessary that gold should be yellow, or water transparent; these facts, we conceive, might have been otherwise arranged. There has been much controversy as to this character of necessity that distinguishes some of our beliefs from others. (See NECESSITY.) The schoolmen laid down three principles, involving what they considered the widest generalizations of our necessary beliefs: these are the laws of identity, contradiction, and excluded middle.

The law of identity is expressed thus: "Whatever is, is;" a proposition justly considered as irresistible. If any objection lies against it, it is, that nothing appears to be got by affirming it. When we say that "Water freezes at 32°," there is a piece of new

information conveyed; by merely knowing water in its liquid state, we should not know that at 32° it became solid; the affirmation is something real. But when we say that "Water is water," there is the form of information, but nothing is conveyed; the proposition belongs to the class termed "identical." We merely reaffirm what is already affirmed. The law of identity can only mean that we are to adhere to the meaning of a word as once given; that is to say, we should be consistent in the use of terms. It is a law, not of things, but of the employment of language to denote things.

The law of contradiction is, that "the same attribute cannot be both affirmed and denied of the same subject;" or that a thing cannot be and not be at the same time. In other words, two affirmations that contradict each other cannot be both true. We cannot say both that the "Sun has risen," and the "Sun has not risen;" "Gold is heavy," and "Gold is not heavy." Here, also, one might suggest the remark, that the proposition is an identical one; for the use of the word "not" can only mean that the proposition to which it is coupled cannot be held along with the proposition to which it is not coupled. That if the affirmative be true the negative must be false, and if the negative be true the affirmative must be false, are but the same thing differently expressed. The word "not" is an abbreviation for what would otherwise be a more roundabout expression. Instead of saying: "I disbelieve and deny that gold is white," we say: "Gold is *not* white." So far, therefore, the principle of contradiction, like that of identity, is not a law of things, but of the use of language; implying simply, that when we have affirmed a fact in one form of words, we must, in varying our terms, adhere to the same affirmation.

But this remark does not exhaust the scope of the principle. It has already been observed (see CONDITIONED), that our knowledge can never be confined to one absolute property; in other words to know a thing, we must know something different from it. We cannot even be conscious of one unvarying impression; animals that live in total darkness are not conscious of the darkness, they would become so only in passing into light. It is true that we are constantly in the habit of mentioning a single property, and leaving out of account the related fact but for which the first would have no existence; we may talk of light without alluding to darkness. But it is not the less certain that the alternative circumstance, for the time suppressed, is a real part of the case; and there are many occasions, when our meaning cannot be fully imparted without actually quoting the alternative; and to be logically or formally complete, we ought at all times to state the two.

There are many qualities the very mention of which brings vividly before the mind an opposed couple: as, up, down; straight, crooked; desire; aversion; etc. But beyond these cases, it is a tenable assertion that every fact or property recognized by the human mind must be recognized with relation to some other fact or property, its contrast or opposite, but for which as an alternative, the mind would not have that opportunity of *transition* essential to consciousness itself. Take *redness*, which does not suggest to the mind an opposite in the same manifest form as in the above instances. If all light were red there would be no designation of redness; the only terms would be light and dark. But as there are varieties of light, that is, as we experience mental shocks or impressions by transitions occurring under the luminous agency, we are made alive to subordinate differences, which we mark as so many distinct properties. When white and red are presented to the eye in succession, there is imparted a shock of difference, developing an item of knowledge, which, to be fully expressed, would be "white-red." White would then mean the opposite of red, and red the opposite of white; to the affirmation, "Snow is white," there would correspond as an essential and inseparable part of the same fact, "Snow is not red." But as there are a great many transitions of color that make the mind sensible to difference, the mention of one color is attended with, not one simple denial, but many denials. We have red-green, red-yellow, red-blue, etc.; and, moreover, when these couples pass in succession before the view, we are further struck with the fact of *agreement* in the common effect "redness." Thus, the fact or property, "redness," is the name for the common element in certain couples, which element it affirms, while denying in each case the contrasting element; it is not-white, not-green, not-yellow, not-blue, and not every other color, which placed side by side with it made the mind alive to difference. When, by differences and agreements as now described, a class of colors is constituted, the mention of one is the denial of every other member of the class; and the denial of one is the mention of some other or others, provided we are keeping our attention confined to that class. Prof. de Morgan introduced into logic the phrase "universe of the proposition," to intimate the class of objects implied when an affirmation, with its corresponding denial, is given forth. Thus, "Such a thing is red," implies as the universe of the proposition the class of colors; "A rose smells sweet" is in the universe "odors."

Many other examples might be quoted in illustration of the general principle, and also to show that, in the case of ambiguity or uncertainty in the meaning of a positive term, the proper remedy is to demand an explicit statement of the quality, or qualities, denied. Thus, if a thing is spoken of as "beautiful," which contrast is intended? for there are several implied in the name. Is it "beautiful, not ugly or deformed," "not indifferent or insipid," "not sublime?" etc. The important function of *defining* terms is thus, in the last resort, to bring into open statement, what is usually left in the form

of a tacit understanding, the denial corresponding to each affirmation. See also CONDITIONED.

The principle of excluded middle is another form of the principle of contradiction, implying the same general fact, and resting on the same foundation. It is, that of two contradictories both cannot be false, or one must be true. Any given assertion must be *either* true or false; either the affirmative is true, or otherwise the negative is true, which means that the affirmative is false. "This house is either mine or not mine;" "Gold is yellow, gold is not yellow," cannot be both false, one must be true. There is no *middle course* in such an alternative. But on examination, it will appear that this principle does not hold in the same unqualified sense as the principle of contradiction; for the attribute affirmed or denied must be something intelligible and definite, as well as relevant to the subject in hand. We often say such a thing is neither big nor little, implying that there is a certain mean point that excludes the extremes, and yet those two terms are the negative of each other. In a word, it is an essential condition of the principle that the universe of the proposition should be distinctly understood and kept in view. If we say, "This is either red or not red," the alternative is indisputable within the universe "color," but not otherwise; the taste of an orange is neither red nor not red; if we jump over the boundaries of the class, the principle no longer holds good.

The three principles of identity, contradiction, and excluded middle, are usually talked of as necessities of the human mind, from which there is no escape. But we have just seen that in the case of the excluded middle, there are possible evasions; and even the principle of contradiction itself is flatly met by Hegel, who lays it down as a maxim of his philosophy that "being" and "not being" are the same, and deduces important inferences therefrom. All this should make us cautious in declaring any formula or any doctrine to be absolutely necessary, or imperative on the human mind.

IDES. See CALENDS.

IDIOCY is the non-development of the mental faculties. A dement is deprived of powers which he once possessed; an idiot never, or only imperfectly, possesses such powers. In certain cases, the human form appears scarcely to be animated by intelligence at all; it is a senseless, motionless mass, to which the special senses impart no intimation of an external world, and from which there emanate no manifestations of human love or passion, or perception. The degrees of deprivation are, however, very numerous and sharply defined, so as to suggest different modes of management and training, and different degrees of moral responsibility in the individuals. The general characteristics of the vast majority of idiots may be held to be diminutive stature, grotesque appearance, inactivity, uncleanly habits, gluttony, obtuse or acute sensibility, inability to regulate movements, to articulate, to count, degradation of propensities, and helplessness. The various degrees of their dependence upon others has been estimated thus: of 574—53 were as helpless as infants; 74 as children of two years old; 94 as children of seven years old; 138 could engage in simple work with some small profit, if carefully watched and directed; 179 could nearly earn their bread; and 36 could, under due discipline, maintain themselves. In this calculation imbeciles are included. The arrestment of the evolution of intelligence, in whole or in part, may commence and be consummated previous to birth, in consequence of moral impressions, or accidents, or diseases on the part of the mother; during infancy, from defective nutrition or injudicious management; and during childhood up to puberty, from scrofula, rickets, hydrocephalous, and from unwise interference with the faculties in process of growth. A large number of idiots are microcephalous, or present heads of very small dimensions; and though they decay and die at an early age, they are apparently healthy. But a much larger number are not merely examples of imperfect growth; they labor under positive disease and degeneration, and present symptoms either of constitutional taint, or of those specific affections, such as convulsions and paralysis, as are referred to the nervous structure.

The ameliorations which occasionally takes place under judicious treatment, and the educability of a few individuals within a certain range, have suggested to physicians and philanthropists the propriety of attempting to rouse, direct, and apply such powers as may exist. The first attempt to give regular instruction to idiots was made in the Bicêtre at Paris many years ago. A magnificent training-school, now numbering about 600 inmates, has been some time in operation at Earlswood, Reigate; and there is a similar institution at Larbert, Sterlingshire, while a smaller school exists at Baldoran, Forfarshire.—Sequin, *Traitement Moral, etc., des Idiots;* Art. "Idiotisme," *Dict. de Médecine;* Abbots, *Handbook of Idiocy;* Buckminster Brown, *Treatment and Cure of Cretins and Idiots.*

IDIOCY (*ante*). The great distinction between idiocy and that form of insanity called dementia is that the latter is acquired, comes on in an individual who has had rational faculties, and therefore has vestiges of previously formed ideas; while the brain of the idiot is a blank, and of a kind which can scarcely be made to receive an impression until some further organic development is effected. The demented person, as the name implies, has lost a part of his mind, but the idiot is in a state of amentia, a term which strictly applies not to the demented condition produced by disease or feebleness,

except when the dementia is complete. Want of organization, or defective development, is the cause of idiocy, and this defect is apt to be accompanied by dwarfishness, and more or less apparent malformation and grotesqueness, and the defects are often so great that little or no mental structure can be erected, very little more, indeed, than the simplest habits, and these to a great extent connected with the promptings of the senses. The causes of idiocy are various. Its elements are no doubt hereditary, that is to say, a course of conduct in a parent which tends to degeneration, such as excessive sensual indulgence of any kind, will tend to induce arrested development in offspring. Residence in certain localities, as the lower valleys of the Alps, appears to favor arrest of cerebral and bodily development—according to Virchow—in consequence of the great amount of lime drank with the water. The attempt to educate idiots commenced in the 17th c , with an experiment of St. Vincent de Paul at the priory of St. Lazarus. His efforts to teach idiots, though continued for many years, were not successful. In 1799 the celebrated Itard took a wild boy, found in the forests of Aveyron and attempted to teach him; and although the success in this particular case was slight, he believed that he had discovered methods and facts which would be of use in other cases. These he communicated to his pupil, Dr. Seguin, who, in 1838, opened a school for idiots in the hospital for incurables at Paris. He met with success enough to have the idiots at the Bicêtre sent to the hospital to be instructed, and in the course of three years he received the approval of the French academy. Dr. Seguin adopted a system involving the theory that idiocy was prolonged infancy. His practice, founded upon this, was to excite and continue the process of development. Of course a variable success attended the experiment. The art of effecting such development requires much knowledge, tact, and patience. Different kinds of idiots need different stimulants, physical and mental. Pure air, good nutritious food, exercise; in short, any treatment which is calculated to increase the bodily and mental functions will improve the idiot. Wherever his interest can be awakened there will be a mental stimulus, and as the tendency of development is toward a normal standard, more or less improvement must follow. Of course the same amount of care expended upon healthy and normal children would show much greater results; and the most that can be expected in the education of idiots is to make them as comfortable and as cheerful as circumstances will allow. It might indeed be possible, by continuing the education of idiots through many generations, to raise them to an approach to the normal primitive standard of manhood, but the difficulties would be great.

According to the census of 1870, which is the latest authority obtainable at the present time, Nov., 1880, the number of idiots in the United States was 24,477, distributed among the States as follows:

Alabama	721	Maryland	362	Rhode Island	123
Arkansas	289	Massachusetts	778	South Carolina	465
California	87	Michigan	613	Tennessee	1,091
Connecticut	341	Minnesota	134	Texas	451
Delaware	69	Mississippi	485	Vermont	325
Florida	100	Missouri	779	Virginia	1,130
Georgia	871	Nebraska	25	West Virginia	427
Illinois	1,244	New Hampshire	325	Wisconsin	560
Indiana	1,360	New Jersey	436	District of Columbia	50
Iowa	532	New York	2,486	New Mexico	46
Kansas	109	North Carolina	976	Utah	23
Kentucky	1,141	Ohio	2,328	Other Territories	15
Louisiana	286	Oregon	55		
Maine	628	Pennsylvania	2,250	Total	24,477

But this number falls below the reality, and for various reasons. Parents are often unwilling to admit or to believe that their children are idiots, and often present them to physicians and asylums for treatment for "strangeness of manner," etc. The degrees and forms of idiocy are also various, and not easily recognized by an unprofessional person; thus many escape being put in the list by the census taker. The number of idiots in England, Ireland, Scotland, and Wales was estimated according to the census of 1871 to be 39,452, but it has been thought by competent authorities to be over 50,000. In Switzerland the number of idiots is estimated to be about 4,000. See CRETINISM.

IDIOSYN'CRASY (Gr., a peculiar temperament), the name given to any constitutional peculiarity. Thus, there are persons who have a great dislike to particular kinds of foods, smells, sounds, etc., which to most persons are agreeable; and, on the other hand, a desire is sometimes manifested for things generally disliked. In particular individuals, again, an eruption of the skin will be caused by eating strawberries, or swooning by the smell of a rose, and that quite unconnected with any liking or disliking; and such effects are produced when the person is unaware of the cause. Idiosyncrasies also occur, in consequence of which certain medicines become inoperative, or certain poisons harmless. Idiosyncrasies are either permanent or temporary, sometimes arising from mere morbid conditions, and disappearing along with them.—The term is also employed to denote *mental*, as well as *physical* peculiarities.

IDOM'ENEUS, a Greek who succeeded his father, Deucalion, as ruler of Crete, called also Lyctius and Cnossius, from the Cretan towns Lyctus and Cnossus, of which he is

said to have been a native. He accompanied the Grecian fleet with 80 ships to the Trojan war, where he was distinguished for valor. It is said that, overtaken by a tempest on returning, he vowed to Neptune that if saved he would sacrifice to him the first living thing that met him on the Cretan shore. It was his son who appeared, and he fulfilled his vow, but for his cruelty was banished by his subjects. Sailing to Italy, he founded a city in Calabria, and built a temple to Minerva. From Calabria he went to Colophon, where he died.

IDOCRASE. See VESUVIAN.

IDOL (Gr. *eidōlon*, an image), **IDOLATRY** (worship [*latreia*] of images). By the name idol is meant an image intended to represent a divinity, and to be adored as such. The act of worshiping such an object as a divinity is called idolatry. Although the first principles of reason suggest to man's mind the idea of one supreme being, the source of all existing things, and the origin of all good (see GOD), yet the very earliest historical records, sacred and profane, teem with evidences of the errors into which men quickly fell through ignorance and passion, changing "the glory of the uncorruptible God into an image made like to corruptible man, and to birds, and four-footed beasts, and creeping things" (Rom. i. 23). To these images, as well as to the images of inanimate objects, or of the ideal powers or forces supposed to be embodied in such objects;—as the sun, the moon, the stars, air, water, fire, and other natural elements—divine honors were paid by most of the ancient nations; to which honors the name of idolatry has been given. Hence, as each of these corrupt worships had its own peculiar symbols, the idolatry of the ancient gentile religions may be reduced to four classes: 1. The idolatry of nature-worship, which was of two kinds—the first of inorganic nature, which consisted chiefly in *litholatry*, or the worship of stones or pillars, mentioned in Leviticus, xxvi., and in Numbers xxxiii. 52; the second of organic nature, or of the powers of nature, as *dendrolatry*, or the worship of trees—under which form were symbolized the productive or generative powers of nature, and to which the most modern investigators of Phenician antiquities trace the origin, as well of the grossly immoral worship of the *Ashtaroth* of the Phenicians, as of the phallic worship, which found its way, under various forms, through all the kindred races, both in the west and in the east. 2. The idolatry of animal worship, which we find as well in the (perhaps originally symbolical) worship of the sacred oxen, the crocodiles, and serpents among the Egyptians, as in that of the still more degrading forms of animal life which constituted the object of adoration with other nations. 3. A higher form of idolatry, which prevailed among the races of Chaldean origin, was *astrolatry*, or star-worship, which is often designated by the name of *sabæism*. There was one form of sabæism which cannot strictly be called idolatry, as it did not involve the use of idols, but addressed itself directly either to the heavenly bodies themselves, or to the element of fire, with which they were associated. But the same object of religious worship, coupled with the use of idolatrous representations, is found in the worship of Baal, of Moloch, and of Tammuz, the Phenician Adonis (Ezekiel, viii. 14). 4. The last form of idolatry, and that which prevailed in the later period of the ancient gentile religions, was *anthropolatry*, or the worship of representations of the human form. It is chiefly familiar to us through the mythology of Greece and Rome, but it also found a place in most of the other religious systems, in some of which the representations of the human form were variously modified, so as to symbolize those special attributes which form the peculiar objects of the worshipers' adoration. Of this there are many examples in the mythological representations of the Egyptians and of the Indians. In the Egyptian religion, indeed, and in the later Grecian, many of the idols were representations of pure abstractions, as of certain faculties or affections of the mind, of virtuous desires, or of evil passions. Nor can it be doubted, that among the more cultivated classes, there were individuals by whom these abstractions were fully understood, and by whom the crude idolatry of the multitude was regarded solely as a device adapted to their more gross and material conceptions.

The Jews, notwithstanding the many safeguards by which the belief of the one supreme being was protected in their religious system, were frequently seduced into the idolatrous worship of the gentile nations among which they were thrown. It is one of the most remarkable among the anomalies of the history of this singular people, that the great and radical purification of their faith in the unity of God dates from their protracted Babylonian captivity, from which time it was maintained, notwithstanding the effort of Antiochus Epiphanes to introduce the Greek idolatry (1 Macch. i.) down to the coming of our Lord. The idolatry into which the Jews fell at different periods was chiefly of the first and the third forms described above.

The idolatry of the savage tribes of the African and Oceanican races is for the most part of the class described under the head FETICHISM.

IDRIA, a small but important t. of Austria, in the crownland of Carniola, celebrated for its quicksilver mines (discovered in 1497), is situated in a deep, caldron-shaped valley, on a river of the same name, 22 m. w.s.w. of Laibach. The descent to the mines is by 787 steps, hewn in the rock, and is easy and free from danger. They are said to be the richest in Europe. Upwards of 330 tons of quicksilver are produced here annually, and about 60 tons of cinnabar (red sulphuret of mercury). Pop. '69, 3,960,

about 400 of whom are regularly employed as miners, the others chiefly in the manufacture of linen and silk fabrics and bone-lace; and in distilling spirits.

IDUME'A. See EDOM.

IDUN, or IDUNA, the name of a goddess of the northern mythology. She was the daughter of the dwarf Svald; but being received among the Æsir, she became the wife of Bragi. Idun possessed a precious apple, by the use of which the gods preserved their perpetual youth. She was carried off by the giant Thiassi, with the assistance of Loki; but the gods sent the latter after her, to bring her back, which he did, after changing himself into a falcon, and Idun into a nut.

I'DYL (Gr. *eidullion*, Lat. *idyllium*, a little image), a term generally used to designate a species of poem representing the simple scenes of pastoral life. It is, however, an error to suppose that the idyl is exclusively pastoral; certainly, there is no warrant for such a notion in the usage either of the ancients or the moderns. Of the thirty *eidyllia* of Theocritus, not more than one-half are pastoral in their character. After the use made of the word by Tennyson, in his *Idyls of the King*, which are epic in their style and treatment, and romantic and tragic in their incidents, it becomes very difficult to say what is not an idyl.

IESI. See JESI, *ante.*

IFFLAND, AUGUST WILHELM, 1759–1814; b. in Hanover, Germany. At the age of 18 he appeared upon the stage at Gotha; in 1779 he acted in Mannheim; in 1796 was made the director of the National theater at Berlin; and in 1811 appointed general director of the royal plays. He wrote many dramas, which were very popular at the time, and several volumes of them have been published.

IF'URIN, the *hades*, or infernal regions of the ancient Gauls, as described in Celtic mythology. A vivid imagination invested the locality with objects of terror, including wild beasts, the mythical dragon, venomous serpents, and an atmosphere impregnated with deadly poisons enveloping the whole. Here the unfortunate, condemned to sustain its tortures, was doomed to eternal misery.

IGASU'RINE, a very poisonous alkaloid, occurring in *nux vomica* with strychnine and brucine. The word is derived from the Malay *igasura* (vomiting nut).

I'GLAU, a very old walled t. of Austria, in the province of Moravia, is situated on the river Iglawa, close to the Bohemian boundary, 49 m. w.n.w. of Brünn. It consists of the town proper and of three suburbs. In the midst of the spacious and beautiful town square stands the guard-house. Iglau carries on spinning, dyeing, and brewing, as well as extensive manufactures of woolen goods and of machinery. Its trade, especially with Poland, is very important. Several very productive silver-works are in operation here. Pop. '69, 20,112.

IGLESIAS, a walled t. of the island of Sardinia, in the province of Cagliari; pop. about 5,000. It is well watered by springs, and corn, wine, and fruits are produced in the surrounding country. In its vicinity are silver and other mines, and the mining operations are prosperous. It has numerous churches, including a cathedral, a fine Episcopal palace, a Jesuits' college, and several convents.

IGLESIAS, JOSÉ MARIA, b. Mexico, 1822. An eminent orator and statesman of the Mexican republic. Before reaching his majority he occupied the chairs of arts and modern languages, respectively, in the colleges of San Gregorio and San Ildefonso, in the city of Mexico. He entered politics as a young man, and speedily attracted attention for his remarkable natural ability. Political preferment rewarded his loyalty to the government, and in 1857 he was a cabinet minister. In 1868 he was a member of the general congress, and the same year was appointed minister of the interior by Juarez, to whose fluctuating fortunes he had clung with unswerving fidelity. In 1873 he became president of the supreme court of justice.

IGLOO'LIK, an island of some historical interest, lies near the e. end of the strait of the Fury and Hecla, in lat. 69° 21′ n., and long. 81° 53′ west. It was named after an intelligent Esquimaux woman, Parry's guide and pilot on his second voyage; and here that navigator passed the winter of 1822–23 from Oct. 30 to Aug. 12. During this time the temperature ranged between—45° and 59° of F., thus yielding a mean of 7° above zero.

IGNA'TIUS, SAINT, bishop of Antioch after 69 A.D., is said to have been a disciple of St. John, and is reckoned one of the apostolical fathers. He bore the surname of *Theophoros*—i.e., one who carries God [or, as Ignatius explained it, "Christ"] in his heart; or, again, as some (Jerome amongst them) wrongly supposed, "one who was carried by God"—i.e., Christ (cf. Mark, ix. 36)—whom, however, according to St. Chrysostom, Ignatius never saw. This legend that he was the little child whom Jesus set in the midst of his disciples, may, however, like the other tradition of his relationship to St. John, be taken as symbolic of his winning, affectionate nature. Ignatius was a true shepherd of his people, one of those meek, earnest, loving spirits to whose beautiful unobtrusive piety Christianity owed its first and best triumphs. Domitian's persecution of the church of Antioch proved him to be no less courageous than pious, and when that storm had passed over, the second and fiercer persecution of Trajan gratified Igna-

tius's wish of being sacrificed for his flock. The story of his interview with Trajan has come down to us. That strong ruler, full of worldly sagacity, just and virtuous after his fashion, could not understand a man so utterly unworldly as Ignatius. He contemptuously called him a *kakodaimon*, or, as we should say, "a poor devil," and in the end condemned him "to be led as a prisoner to Rome, there to be made the food of wild beasts for the amusement [*ad delectationem*] of the people." The sentence was executed 107 A.D., or, according to others, 116 A.D. In the church of Rome his martyrdom is commemorated on Feb. 1; in the Greek church on Dec. 20.

The genuineness of the writings (a liturgy and a little work entitled *Didaché*, quoted by Chrysostom) and epistles ascribed to him—of which 15 (12 in Greek and 3 in Latin) are now extant—and some of which are quoted in the 2d, 3d, and 4th c., and were widely read in the ancient church, has been eagerly discussed and much disputed since the 16th century. The common opinion of scholars (until perhaps the last 20 years) was in favor of the genuineness of seven of the Greek epistles, which are extant in two redactions of different length, and in two corresponding ancient Latin translations—those to the Ephesians, Magnesians, Philadelphians, Trallians, Smyrneans, Romans, and to Polycarp, his contemporary; but even these were regarded as spurious by Daillé, Semler, Hermann, Ernesti, and others, with whom in the main Neander concurs. The controversy received a new impetus by the publication of Bunsen's *Ignatius und seine Zeit* (Hamb. 1847), in which that writer endeavored to establish the genuineness of three of the seven epistles, and the spuriousness of the others; his conclusions were, however, assailed by the great leader of the Tübingen school, F. C. Baur, in his *Die Ignatianischen Briefe und ihr neuester Kritiker* (Tüb. 1848). The most probable view of the seven epistles is that which conceives them to have a basis of genuineness, but to have suffered extensive interpolation. The reason why these epistles have excited so keen an interest, especially among ecclesiastics, is, that the question of church government is believed to hang very much upon them; they are, in fact, a battle-ground between Episcopalians and Presbyterians; and as they seem to favor the hierarchical system of the former, Episcopalians have, as a rule, been strenuous in defense of their Ignatian origin, while Presbyterians have as warmly attacked it. The discovery, in an Egyptian convent, of a Syriac version of three of the epistles—those to the Romans, the Ephesians, and to Polycarp (published by the rev. W. Cureton, formerly of the British museum, under the title of *The Ancient Syriac Version of the Epistles of St. Ignatius*, etc., Lond. 1845), has, on account of its possessing higher claims to be considered genuine than any Greek MSS., led to the conclusion that the common Greek text has been very seriously tampered with—the interpolations consisting often of passages enforcing episcopal authority, and asserting the deity of Jesus Christ.

The text of the writings ascribed to Ignatius is to be found in the various editions of the apostolic fathers, from that of Cotelerius (2d ed. 1724) to the recent and admirable one edited by Gebhardt, Harnack, and Zahn (1876). There are English translations by archbishop Wake and in the *Ante-Nicene Library* (Clark, Edin.). See Zahn, *Ignatius von Antiochien* (1873).

IGNATIUS LOYOLA. See LOYOLA.

IGNATIUS'S (ST.) BEANS, the seeds of the *Ignatia amara*, formerly *strychnos Ignatii*, a tree of the natural order *loganiaceæ*, and nearly allied to that which produces *nux vomica* (q.v.), a native of Cochin-China and of the Philippine islands. The fruit is of the size of a large pear, and contains about 20 brownish seeds, of about the size of olives, rounded on one side, and somewhat angular on the other. These seeds came into the Dutch shops under their present name about the end of the 17th c., but there is some reason to think that they are the *nux vomica* of earlier writers. They contain *strychnia*, and their medicinal uses are similar to those of *nux vomica*.

IGNEOUS ROCKS are those which have been produced from materials fused by heat. They differ from the sedimentary rocks in their origin, structure, and position. They invariably come from below upwards, breaking through the older rocks. The materials of sedimentary strata are fragments of pre-existing rocks, worn, by the action of water, either into a fine mud or into rounded particles, of greater or less size; whereas igneous rocks exhibit either a vitreous structure, as when they have been quickly cooled; or a granular structure, composed of more or less minute crystals, according to the rate of cooling or a vesicular structure, when they have been expanded by the contained gases, or by being brought into contact with water. Some rocks are erroneously called igneous, whose materials, though originally obtained from volcanoes or other subterranean source, have yet been ultimately arranged by water, like the materials of Grahame's island (q.v.). When this fact receives due consideration, many igneous rocks, whose position is now a puzzle, will be better understood. Some of the rocks composing Arthur's seat, near Edinburgh, are undoubtedly of this character, and before a right theory of the hill can be constructed, these must be separated from the truly igneous rocks. In position, also, the igneous may be distinguished from the sedimentary rocks, for they seldom occur regularly stratified, with a parallel upper and under surface, but are generally local, thinning out into wedge-shaped beds, or having that irregular stratification which may be seen in modern lava. They also occur as upright walls or dikes, filling up cracks in the sedimentary strata

The most satisfactory classification of the igneous rocks is based upon their age. The three divisions thus established are each characterized by peculiar mineral and structural differences. The oldest or granitic series (see GRANITE) are generally associated with the paleozoic strata, but are sparingly found in the secondary, and even in the tertiary formations. The special peculiarity of the granitic rocks is the great abundance of silica contained in them; it forms not only a considerable amount of the constituents of the hornblende and feldspar, but crystallizes free in the rock-mass as rock crystal. The trappean rocks (q.v.) are associated with the paleozoic and secondary strata, and are composed of crystals of feldspar and hornblende, varying in their character according to the predominance of the one or other of these ingredients. The volcanic (q.v.) are the newest igneous rocks; they belong to the present period, or the tertiary strata. The chemical ingredients are the same as those that constitute the trappean rocks, but they are somewhat differently built up, augite being the peculiar form the silicate of magnesia and lime assumes in the newer rocks, while it appears as hornblende in the older or trappean series.

IG'NIS FAT'UUS (Lat. "vain or foolish fire") is a luminous appearance frequently seen in marshy places, churchyards, and over stagnant pools, which has puzzled philosophers from the time of Aristotle. It generally appears a little after sunset, as a pale bluish-colored flame, varying in size and shape; sometimes it shines steadily till morning, at other times disappears, and reappears within about half-hourly intervals. It floats in air at about 2 ft. from the ground, is sometimes fixed, and sometimes travels with great rapidity. In general, it recedes on being approached, and *vice versa*, though several successful attempts have been made to light a piece of paper by it. Many efforts have been made to discover its cause; but so varied are its appearances, and so void of any common principle, that these attempts have totally failed. Of the various theories advanced we need mention only two. The first is that the ignis fatuus is due to *phosphureted hydrogen gas* (PH_3), which possesses the power of spontaneous ignition on coming in contact with dry atmospheric air; the gas would be generated by the decomposition of animal matter present in a marshy soil. The motion of the ignis fatuus is accounted for by the flame being communicated along the line of a stream of the gas. The second is that it is due to the combustion of *light carbureted hydrogen gas* (C_2H_4), arising from the decomposition of vegetable matter; but though this supposition satisfactorily accounts for many appearances connected with the ignis fatuus, the gas itself is not spontaneously combustible, and an additional supposition requires to be made to account for its ignition. The probable conclusion is that a number of phenomena similar to the eye, but arising from different causes, are aggregated under the term ignis fatuus. *The ignis fatuus, however, has never been produced artificially.* Electricity and phosphorescence can produce the luminous appearance, but, as far as our present knowledge enables us to judge, they are unable further to imitate it.

It is not a common phenomenon, many distinguished naturalists never having seen it; but it is not unfrequently seen in the n. of Germany, the swampy and moorland districts in the s. and n.w. of England, and in the lowlands of Scotland. It is seen in the above places from the middle of autumn till the beginning of November. In former times, the ignis fatuus, under the names of *Will-o'-the-wisp, Jack-a-lantern, Spunkie*, etc., was an object of superstition among the inhabitants of the districts where it appears, and was believed to be due to the agency of evil spirits attempting to lure the traveler to his destruction; and, unfortunately, there are too many instances on record of travelers mistaking the ignis fatuus for a lamp, and being thus decoyed into marshy places, where they perished.

IGNORA'MUS (Lat. we do not know), the word formerly written by a grand jury on the back of an indictment, meaning that they rejected it. The words now used are "not a true bill," or "not found."

IGNORANCE OF THE LAW, or IGNORANTIA JURIS, is held in law to be no excuse for any breach of contract or duty, nor for crime or other offense. It is absolutely necessary to start with this maxim, otherwise it would be quite impossible to administer the law, for if once a contrary maxim were allowed, it would not only be a premium to ignorance, but would lead to endless and abortive inquiries into the interior of a man's mind. Ignorance of a fact, however, is a different thing. Another kindred maxim of the law is that every man intends the consequences of his own act. Thus, if he shoot at or give poison to a person, it is presumed that he intended to kill such person. So, if he leave a trap-door open in a street or thoroughfare, it is held that he intended people to fall into it and be injured. There is, however, a doctrine called *bona fides*, which, in the case of petty offenses punishable by justices, often tempers the strict and rigid application of the maxim *ignorantia juris neminem excusat;* and even in crimes a judge always takes into consideration, when passing judgment, whether the prisoner or defendant was an ignorant or intelligent person.

IGNORAN'TINES (Fr. *Frères Ignorantins*), a religious congregation of men in the Roman Catholic church, associated for the gratuitous instruction of poor children in sacred as well as secular learning. It was founded in France in the early part of the 18th c. (1724) by the abbé de la Salle, and has gradually been introduced into every Catholic country of Europe. In France this congregation shared at the revolution the

fate of all the other religious bodies; but the brethren, under the name of Brothers of the Christian Schools, were recalled, and re-established under Napoleon in 1806. They are now exceedingly numerous in France, Italy, and Germany, and many branches exist in England and Ireland. In the latter country they possess, especially in Dublin, Cork, Limerick, and Waterford, large educational establishments; and they have published for the use of their schools a series of school-books which are designed to combine with secular knowledge information on the subject of religion, specially designed for Roman Catholic pupils.

IGUALA'DA, a t. of Spain, in the modern province of Barcelona, and situated about 40 m. w.n.w. of the city of that name, on a rising ground on the left bank of the river Noya. It is for the most part closely built, dark, and dirty; carries on manufactures of cotton and woolen goods, hats, and firearms, is the seat of considerable trade, and contains a pop. of 10,000.

IGUA'NA, a genus of saurian reptiles, the type of the family *iguanidæ*, a family which contains many genera and species, and to which belong some of the largest saurians now existing, except those of the crocodile family. Far larger saurians allied to them existed in former geological periods. See IGUANODON. The *iguanidæ* have a lizard-like form and a long tail. The tongue is thick, fleshy, not extensile, and is notched at the tip. They have rows of small teeth on the palate, and their jaw-teeth are remarkable both for their form and mode of insertion, not being lodged in distinct sockets, but fixed in a kind of furrow along the internal face of the jaw-bone, adhering by one side of the bony surface of the root. The food of the *iguanidæ* consists chiefly of leaves and fruits. They are all natives of warm climates. In the genus iguana the back exhibits a row of elevated, compressed, pointed scales along its whole length and which is continued to the extremity of the tail; whilst under the throat is a great dewlap-like pouch. The feet have long toes, not webbed, with sharp claws, well adapted for climbing trees, while the compressed tail is the organ of progression used in swimming. The COMMON IGUANA, or GUANA, is abundant in the West Indies and tropical parts of America, living mostly among trees. It attains a length of 4 or 5 feet. It is of a greenish yellow color, mottled with green, the tail ringed with brown. It is esteemed a most delicate article of food, and is used by all classes of persons. It is often caught by means of a noose thrown over its head; dogs have also been trained to hunt it on some of the West India *keys*, where it has not opportunity of taking refuge in trees. The eggs—which are about the size of those of a pigeon, but have no hard shell, and are laid in the sand—are also eaten, and are very pleasant. Other species of iguana and nearly allied genera are eaten in tropical America, as the horned iguana (*I. cornuta* or *metapoceros cornutus*) of Hayti. The true iguanas are all American.

IGUAN'ODON (iguana, and Gr. *odous*, tooth), a genus of remarkable gigantic dinosaurian reptiles, more abundant in the Wealden beds of Kent, Sussex, and the isle of Wight than any other genus of associated saurians. Their singular structure, differing in many important particulars from any known reptile, long caused great diversity of opinion as to their true position. Dr. Mantell, their original discoverer and their learned expounder, first knew of their existence from some enormous bones, which, notwithstanding their colossal size, he considered reptilian. A large tooth next turned up, whose smooth-worn crown attested its having belonged to a herbivorous animal. Numerous other specimens of teeth were in progress of time discovered, and Dr. Mantell found that they corresponded in a remarkable manner with the teeth of the small American lizard, the iguana, although they exhibited very striking and important differences. Since the original discovery of the teeth, several other portions of this remarkable reptile have been found. The fragmentary and imperfect materials which have yet turned up make any estimate of the size of this animal purely hypothetical. Dr. Mantell's estimate is as much as 70 ft. in extreme length, while prof. Owen considers it to have been not over 28 feet.

The structure of the skeleton is very remarkable. The fragments of the upper and lower jaw show that the head was produced into a short snout, which supported a nasal horn. The vertebral column was somewhat fish-like, the joints being slightly concave on both surfaces; yet it had lofty neural arches, and the sacrum was composed of five anchylosed joints, a structure found in no other reptile. The limbs were long and strong, raising the body some distance from the ground. The largest femur yet found measures 4 ft. 8 in. in length, and the shaft has a circumference of 25 inches. The leg terminated in a three-toed foot, which produced the enormous tridactyle impressions on the argillaceous Wealden beds that were for some time considered to be the foot-prints of huge birds. The discovery by prof. Owen of all the bones of a perfect foot, however, conclusively connects these impressions with the iguanodon. His figure, in a recent volume of the paleontographical society's publications, exhibits a foot 21 in. long by 9½ in. broad.

The teeth of the iguanodon, while bearing a general resemblance to those of the iguana, were much more complicated both in external form and internal structure than in any other known reptile. In all other known reptiles the vertically flat teeth are always sharp-edged, and fitted only to cut off the plants on which they feed, but the worn

crowns in this animal show that the iguanodon thoroughly triturated its food before swallowing it.

IH'LANG-IH'LANG, a strong and rich perfume from a fine forest-tree of the Philippine and Malay islands, the *unona odoratissima*. The perfume is distilled from a volatile oil yielded by the flowers, and is valued at about $250 a pound.

IHRE, JOHAN, an eminent Swedish scholar of Scottish extraction, was b. at Lund in 1707, and educated at the university of Upsala, where he acquired a great reputation, and carried off the highest honors. He subsequently traveled in France and England, was appointed under-librarian to the academy of sciences on his return to Sweden, and rose through a variety of offices to be professor of belles-lettres and political economy (1748). He died in 1780. Ihre's principal work is his *Glossarium Suiogothicum* (1769), a work of great talent and erudition, which may be regarded as the foundation of Swedish philology. It was got up at the cost of the state, which gave Ihre $10,000 to execute it. His numerous academical disputations, amounting to upwards of 450, are still valuable, especially those on the Mœso-Gothic version of the gospels by Ulfilas.

IKUPA, the principal river of Madacasgar (q.v.).

IL'CHESTER, a small and decayed t. of England, in the co. of Somerset, is situated in the rich valley of the Yeo or Ivel—from which it derives its name—33 m. s.s.w. of Bath. The principal buildings are the parish church, an ancient structure surmounted by a low octagonal tower, and the county jail. Ilchester, supposed to be the Ischalis of Ptolemy, was the principal station of the Romans in this region, and was fortified by them with a strong wall and ditch, both still traceable. Numerous Roman remains have been found here. Ilchester is the birthplace of Roger Bacon. Pop. '71, 743.

ILE-DE-FRANCE, one of the old provinces of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Seine-et-Oise, and Oise. During the last century of the Carlovingian dynasty, the Ile-de-France was possessed by a race of powerful nobles, who latterly took the title of dukes of France. One of the most able of these was Hugo or Hugues, surnamed Le Blanc, or Le Grand, who, for 20 years previous to his death (956), virtually wielded the sovereign power under the Carlovingian kings Louis IV. and Lothaire. His son, Hugo Capet, eventually became the actual sovereign. See CAPETIAN DYNASTY.

I'LETZK, or ILETZKAÏA ZASHCHITA, a small t. and fort in eastern Russia, on the border of the Kirghiz territory (government of Orenburg), situated on the river Ilek, near its confluence with the Ural, in lat. 51° 9' n., long. 54° 59' east. The town was founded by Cossack emigrants in 1737, and contained in 1867 a population of 2,493 inhabitants. It is remarkable for its quarries of rock-salt, the richest in Russia. The salt-beds of Iletzk were formerly worked by the native Bashkirs, but since 1754 both the extraction and sale of the salt are monopolized by the government, and are the source of considerable revenue. All the country round Iletzk, especially along the river Solianka, is one continual layer of salt, covered with a sandy or clayey alluvion, 3½ to 4½ ft. thick. The thickness of the salt-bed is not yet thoroughly ascertained, notwithstanding many investigations, from Pallas up to the present time. The Iletzk salt is considered the best in Russia. On the surface of the bed, cubic blocks of salt are found, pure and transparent like crystal, and weighing from 3 to 30 lbs. each. Various small articles are manufactured out of such blocks, and the common people ascribe to them a healing virtue in ophthalmic disease. Near Iletzk there are two lakes, one of which is salt and warm, the other acid.

ILEUM. See DIGESTION, ORGANS OF.

ILEUM (*ante*), the lower and longer portion of the small intestine, so called because of its numerous convolutions and twists and windings (Gr. εἰλεῖν, to twist). It terminates below in the cæcum, the lower sac-like portion of the large intestine called the colon. The other and upper portion of the small intestine lies between the ileum and the stomach, and consists of the duodenum and the jejunum (q.v.), the latter being next above the ileum, while the duodenum is that portion immediately below the stomach, and is larger in diameter than either jejunum or ileum. The duodenum is about 10 in. long, the jejunum about 6 ft., and the ileum about 12 ft., or about two-thirds of the whole of the small intestine, and it principally occupies the hypogastric and right iliac regions of the abdomen. See REGIONS OF THE BODY. It is the principal seat of enteritis, or inflammation of the mucous coat of the small intestine (Flint), and also the principal seat of lesion in typhoid fever (q.v.), in which the glands of Peyer become inflamed and ulcerated.

ILEUS, or ILIAC PASSION, is regarded by some writers as a distinct disease, but is in reality the closing stage of the severest forms of enteritis, or of colic, and is often connected with some irremovable mechanical obstruction. It may indeed occur in any case in which the contents of the bowel cannot find their way onwards. The peristaltic action of the intestine is inverted; there is intense vomiting, and even feculent matter is discharged by the mouth. Desperate as the condition of the patient is, his case is not absolutely hopeless; but as recovery, when it occurs, is due rather to nature than to art, it is unnecessary to enter into the subject of treatment.

I'LEX, a tree often named in the Latin classics, the evergreen oak or holm oak (*quercus ilex*). See OAK. It is a native of most parts of the s. of Europe and of the n. of Africa, often attaining large dimensions, as it sometimes does where planted in Britain. It grows in general singly or in small groups, and loves the vicinity of the sea. Its leaves are ovate-oblong, acute, leathery, hoary beneath; but they vary much in some respects, from the size of a sloe-leaf to that of a beech, and from being very spiny at the edge to perfect evenness. It is a very ornamental tree, and has not been so much planted in Britain as it deserves. Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are of various quality, sometimes bitter, and sometimes sweet and eatable.—In modern botany, *ilex* is the generic name of the holly (q.v.).

IL'FRACOMBE, a small market t., seaport, and watering-place of England, on the n. coast of the co. of Devon, is finely situated amid picturesque irregular hills, on a cove or inlet of the Bristol channel, 11 m. n.n.w. of Barnstaple. The harbor is formed by ramparts of rock, and furnished with a light-house and a pier 850 ft. in length. The bathing establishment is a Doric building, erected here in 1836, and supplied with sea-water from the shore by means of a tunnel. The town is chiefly dependent upon its wealthier residents and its summer visitors; but an active fishery and coasting-trade are also carried on. Pop. '71, 4,721.

ILHA'VO, a fishing t. of Portugal, in the province of Beira, near the Atlantic. Pop. 8,000.

IL'IAC AR'TERIES. The aorta (q.v.) divides at its lowest point—which is usually on the left side of the body of the fourth lumbar vertebra—into the two common iliac arteries, which pass downwards and outwards on each side to the margin of the pelvis for about 2½ in., and then divide into the external and internal iliac artery of either side. The external iliac passes obliquely downwards and outwards to the femoral arch, when it enters the thigh and becomes the femoral artery. The internal iliac is a short vessel, about an inch and a half in length, which divides into an anterior and a posterior trunk. The anterior trunk divides into several branches, which supply the bladder, the rectum, the generative organs, and muscles both within and on the outside of the pelvis, with arterial blood; while the branches of the posterior trunk mainly supply muscles within and on the outside of the pelvis. The importance of the internal iliac artery in carrying on the circulation in uterine life is noticed in the article FETUS.

ILIJATS'. See ILIYATS.

ILINIZA, or ILINISSA, a volcano of the Cordilleras in Ecuador, South America, 10 m. s. of Quito. There are two peaks, 17,380 ft. high, visible from a great distance at sea.

ILION, a village of Herkimer co., N. Y., in the town of German Flats, on the s. bank of the Mohawk river, and on the Erie canal; pop. '70, 2,876. Horse railroads connect it with Mohawk and Herkimer. It was incorporated 1865. It has two weekly newspapers, and large factories for fire-arms, sewing-machines, and agricultural implements.

ILIS'SUS. See ATHENS and ATTICA.

IL'IUM. See PELVIS.

ILIUM (*ante*), a portion of one of the bones of the pelvis, the os innominatum. In the undeveloped child it is a distinct portion, which afterwards becomes united to the pubis in front and to the ischium behind and below. It is the hip-bone or haunch-bone. The word has the same derivation as ileum (q.v.). Some suppose that the root *εἰλεῖν* refers to the curving or winding of the crest of the ilium, and that the latter does not get its name because it partly supports the intestine ileum.

ILIUM. See TROY.

ILIYATS, or ELIAUTS, a nomadic tribe of Persia and Turkistan, mostly of Turkish, Arabic, or Kurdish descent. They are Mohammedans of the Sunni sect. They have no settled abode, but live in tents, moving from place to place, according to climate or season. They have large flocks and herds, and some tribes live by plunder. Each tribe pays tribute in cattle for the use of grazing ground, money not being known among them.

IL'KESTON, a thriving market t. of England, in the co. of Derby, and situated 10 m. n.e. of the town of that name, on an eminence in the valley of the Erewash. Manufactures of hosiery and lace are here carried on, and a number of the inhabitants are employed in the coal and iron works of the vicinity. Pop. '71, 9,662.

ILLE-ET-VILAINE, a maritime department in the n.w. of France, formed out of a portion of the old province of Bretagne, is quadrangular in shape, and lies between the English channel and the department of Loire-Inférieure. Area, 2,590 sq.m., or 1,646,670 sq. acres, of which 1,016,580 acres are arable land; pop. '76, 602,712. It is watered chiefly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. The usual grain crops are raised in sufficient quantity to meet the wants of the

population. Flax and hemp are extensively produced, and the cider of this district is esteemed the best produced in the country. Cattle are reared in great numbers, iron mines are worked, and great varieties of linen and woolen fabrics are manufactured. The department is divided into six arrondissements—Rennes, Fougères, Montfort, St. Malo, Vitré, and Redon. Rennes is the capital, and St. Malo the principal seaport.

ILLEGITIMACY. See LEGITIMACY; BASTARDS.

ILLIC'IUM, a genus of trees of the natural order *magnoliaceæ*, having flowers with three or six petal-like sepals, numerous petals arranged in several rows, and numerous stamens and pistils; the capsules arranged in a star-like form, opening upwards, and each containing a single seed. The species are few, but very widely distributed. The most important is *I. anisatum*, the fruit of which is known as star anise, or Chinese anise. See ANISE. This tree is held in high estimation among the Japanese, and is planted near their temples, as their gods are supposed to delight in it.—Among the other species is *I. floridanum*, a shrub with fine pendant clusters of dark purple flowers, native of Florida and Louisiana, of which the leaves are very fragrant, the capsules also smelling of anise, though more faintly than those of the Chinese tree. Similar in fragrance is *I. parviflorum*, another Floridian species.

ILLIMA'NI, one of the principal mountains of the Bolivian Andes. See ANDES.

ILLINOIS', a river of North America, is formed in the n.e. portion of the state of Illinois by the union of the Kankakee and Des Plaines, flows s.w., and joins the Mississippi 20 m. above the mouth of the Missouri. It is 500 m. long, and is navigable for 245 miles. It is broad, deep, and sluggish, and widens occasionally into lake-like expanses. It is connected by a canal with lake Michigan.

ILLINOIS, one of the United States of America, extending from 36° 56′ to 42° 30′ n. lat., and 87° 35′ to 91° 40′ w. long., being 388 m. long, and 212 wide; containing an area of 55,405 sq.m., or 35,459,200 acres. It is bounded n. by Wisconsin; e. by lake Michigan, and the state of Indiana, from which it is partly separated by the Wabash river; s. by the converging rivers Mississippi and Ohio, which separate it from Missouri and Kentucky; and w. by the Mississippi, which separates it from Missouri and Iowa. The state is divided into 102 counties; the capital is Springfield, near the center of the state, and the most important towns are Chicago, the principal port on lake Michigan, Galena and Alton on the Mississippi, and Cairo, at the southern terminus of the Central railway, and the confluence of the Ohio and Mississippi rivers. The population of the state has increased with marvelous rapidity. In 1810 it was 12,282; in 1820, 55,211; in 1830, 157,445; in 1840, 476,183; in 1850, 851,470; in 1860, 1,711,753; and in 1870, 2,511,096. More than half the people of Illinois were born in other states or foreign countries, a large number being Irish and Germans. In 1850 there were but 707 paupers in a population of 851,470. The state of Illinois is generally level, having few hills and no mountains. The lowest portion is but 340 ft., and the highest only 1,150 ft., above the gulf of Mexico. It is nearly covered by fertile prairies; while river bottoms, with a soil of vegetable mold 40 ft. in depth, have produced heavy crops of maize for many successive years without manuring. The country is so level that the canal which unites lake Michigan with Illinois river and the Mississippi is fed by water pumped from the lake to a height of 12 feet. The principal rivers, besides those which form the boundaries, are the Illinois and Rock rivers, and their tributaries. The whole state is of limestone formation, with rich lead deposits in the n.w., and a large portion of the great bituminous coal formation, 375 m. long and 200 wide, lying in this and the adjoining states. The climate is mild, with an average of 77° Fahr. in summer, and 33½° in winter, but ranging from 20° below to 100° above zero; it is also healthy, except in swamplands or river-bottoms, which are subject to fever and ague and bilious diseases. The productions are wheat, maize, tobacco, cattle, hogs, apples, pears, peaches, grapes, etc. There were in 1865, 3,157 m. of railway in operation: in 1875 the mileage had increased to 6,742 miles.

In 1870 Illinois contained 11,050 public schools, 6 universities, and 779 other schools. In the same year it produced 30,128,405 bush. of wheat, 129,921,395 bush. of Indian corn, and 42,780,851 bush. of oats. In 1830 the Mormons built the city of Nauvoo, on the Mississippi; but in 1844 their prophet, Joseph Smith, was killed by a mob; and his followers, 20,000 in number, made their exodus across the plains to the territory of Utah.—Illinois was first explored by La Salle, and the French missionaries and Indian traders, who formed the earliest settlement at Kaskaskia, in 1673. Ceded by France to Great Britain, and then to the United States, it remained a portion of the North-west territory, until its organization as a state, with a governor and legislature, in 1818.

ILLINOIS (*ante*), is the eighth state admitted to the union under the federal constitution, and by the census of 1870 the fourth in population; of 1880, the same. It lies between lat. 36° 59′ and 42° 30′ n., and long. 87° 35′ and 91° 40′ w.; extreme length n. and s., 385 m.; extreme breadth e. and w., 218 m.; area, 55,410 sq.m., or 35,462,400 acres. Its name is derived from its principal river, and is of mixed Indian and French derivation. The first white settlements in the state were made by the French from Canada, who followed the explorations of Marquette and La Salle. The latter, having crossed the lakes in 1679, descended the river which he named Illinois and built a fort at the

foot of lake Peoria, a broad expansion of the stream for a distance of some 25 m. about midway in its course through the state. After descending the Mississippi for some distance he returned to Canada, but came again in 1682 with a colony, and founded Kaskaskia, Kahokia, and some other towns. These settlements, early in the 18th c., were visited by Jesuit missionaries, who described the country as a new paradise. The colonists were on the most friendly terms with the Indians, and finally degenerated to their level. In 1762 Canada and the whole American territory e. of the Mississippi passed under British control, but the Illinois settlements were not disturbed. After the peace of 1783 the Illinois country was ceded to the United States, and in 1787 the whole national domain n. of the Ohio was organized under the name of the North-west territory, by an ordinance which protected it forever from the inroads of slavery. In 1800 this immense territory contained only a little more than 50,000 inhabitants. In the same year Ohio was organized as a separate territory; in 1805 Michigan was set apart in the same way; and in 1809 the territory of Indiana was organized. What remained of the original North-west territory was soon organized under the name of Illinois. It embraced, besides the state itself as at present bounded, Wisconsin and part of Minnesota, and contained a white population of a little over 12,000. The Indians at this time were very troublesome, and the settlement of the territory was consequently much impeded. After the close of the war of 1812 Indian hostilities ceased, and the territory began to be occupied by emigrants from the eastern states. In 1818 Illinois, with its present boundaries, was admitted to the federal union as a state. The census of 1820 reported the population to be 55,211; that of 1830 showed it to be 157,445. In 1831 there was further trouble with the Indians, which culminated in the Black Hawk war and the removal of all the Indian tribes from the state. After this the population increased rapidly, congress made an appropriation for the improvement of the harbor of Chicago, and the construction of the Illinois and Michigan canal was begun. In spite of the financial revulsion of 1837, the effects of which upon the new state were of the most serious character, the census of 1840 showed a population of 476,183, a gain of 318,738 in ten years. In 1840 the Mormons settled at Nauvoo, intending to make it their "Jerusalem." Their doctrines and practices were very distasteful to their neighbors, and a great excitement was the result. Joseph Smith, the founder of the sect, and his brother Hyram, were arrested and put into jail at Carthage for destroying a press established by a party of Mormons to oppose polygamy. They refused to submit to an arrest by the civil officer, and the sect, numbering 20,000 people, organized for their protection. They finally surrendered to the military, but the public mind had now become so inflamed that before they could be tried, the jail was invaded by a mob and they were killed. The sect soon afterwards removed to Utah. The population of the state in 1850 had increased to 851,470. The grant by congress of extensive sections of the public lands to aid in the construction of the Central railroad, which was completed in 1856, had the effect of drawing multitudes of people to the region through which it passed, and of building up many flourishing towns and villages, and in the course of a few years every acre of government land in the state was sold. Kaskaskia was the territorial capital; the state capital from 1818 to 1836 was at Vandalia. At the last mentioned date it was removed to Springfield, where it has since remained.

The streams of Illinois, with the exception of a few short ones in the n.w. part of the state, which empty into lake Michigan, find their way directly, or indirectly, to the Mississippi. The largest river wholly within the state is the Illinois, which is formed by a junction of the Des Plaines from Wisconsin and the Kankakee from Indiana, and flows nearly 500 m. before reaching the Mississippi. It is navigable for 245 m. from its mouth. The Chicago river, which formerly emptied into lake Michigan, now flows out of that lake by an artificially defined channel into the northern branch of the Illinois. The chief affluents of the Illinois are the Fox, Spoon, and La Main rivers, and Crooked creek from the n. and w., and the Vermilion, Mackinaw, and Sangamon rivers, and Macoupin creek from the s. and east. The Kaskaskia rises in Champaign co. and runs parallel to the Illinois for 250 m., flowing into the Mississippi near the s. border of Randolph county. Rock river, which rises in Wisconsin, flows through the n.w. portion of the state, and enters the Mississippi at Rock Island. The Wabash, which divides the state from Indiana on the e. for a considerable distance, receives the waters of the Big Vermilion, Embarras, and Little Wabash, and flows into the Ohio in Gallatin county. The Big Muddy, an affluent of the Mississippi between the Ohio and the Kaskaskia, drains a considerable extent of territory. The surface of the state is a gently inclined plane descending from the n.e. in a s.w. direction toward the Mississippi. With the exception of a low ridge extending across the southern end of the state, there is not a single elevation that can be properly called a mountain. In the north-western corner, where there are extensive deposits of lead, the surface is broken into small hills, and there are bluffs on the Mississippi and Illinois rivers, which, in contrast with the prairies, present a picturesque appearance. The largest portion of the state consists of level or gently undulating prairies, with a rich and deep soil. Geologists think that anciently the waters of the great lakes flowed into the gulf of Mexico through the channels of the Illinois and the Mississippi. It is also conjectured, from the diluvial character of the soil, that the larger portion of the surface of the state was once the bed of an immense lake. The loam and mold which form the surface are underlaid by an almost solid bed of clay

which prevents the moisture from wasting. In the river bottoms the mold is sometimes more than 25 ft. deep, and of inexhaustible fertility. In almost every part of the state the plow is never obstructed even by a pebble. Over these extensive prairies, in their wild condition, once roamed innumerable herds of buffaloes, which fattened upon their rich vegetation. The prairies are generally interspersed with islands of oak and other forest trees, and there are occasional wooded belts where the limestones and sandstones above the coal formations come to the surface.

The state has an immense field of bituminous coal, 375 m. in length and 200 m. in breadth, which furnishes a supply of fuel sufficient not only for home use, but for extensive exportation, so that the demand for wood is limited. But for this abundance of coal the state must ere now have been utterly denuded of her forests. The trees most abundant are oak, black walnut, sugar maple, ash, locust, elm, hickory, linden, persimmon, pecan, cottonwood, sycamore, buckeye, tulip, poplar, beech, and black birch. Yellow pine, cypress, and cedar are found near the Ohio river. The iron ores are of an inferior quality, but are sometimes utilized by mixing them with those brought from Missouri and lake Superior. Lead, with a mixture of silver, is found in Joe Daviess co., in the n.w. corner of the state, and is mined extensively. Veins of copper ore are found in the n. part of the state, and worked with profit. Zinc also is found in the same quarter. Limestone of good quality for building and burning, and freestone, marble, and gypsum, are found in some places. Salt springs exist in Jackson, Vermilion, and Gallatin counties, and sulphur and chalybeate springs in Jefferson county. In Hardin co., on the Ohio river, is a cave 80 ft. sq. and 25 ft. high, which in the early days of this century was the resort of criminals and outlaws.

Many of the wild animals have been exterminated. Few deer are left, and bears, panthers, and wildcats are rare. The prairie wolf is sometimes met with in sparsely settled regions, and foxes, hares, and squirrels are numerous. Game-birds, such as the wild turkey, prairie-hen, and grouse, are plentiful. Fish of good quality and in considerable variety are found in the rivers and lakes. The insect tribes are numerous, and a few of them are injurious to vegetation. The climate of the state varies with the degrees of latitude. In the n. the summer heat is intense, the winter cold severe. There being no mountains to break the force of the winds they are very cutting in the cold season, while the summer heat is mitigated by them. The atmosphere is rarely in a calm condition. In the extreme n. part of the state the mean annual temperature is 47½°, while in the extreme s. it is 58½°, and in the center 54°. The climate, except in the low swampy bottom lands, where bilious and intermittent fevers prevail, is exceedingly favorable to health. The proportion of clear to cloudy or rainy days is a little more than two to one.

As an agricultural state Illinois stands in the first rank. It contained in 1870 10,329,952 acres of improved and 6,552,909 of unimproved land; and, of the unimproved lands, 1,491,331 acres were wooded. Total number of farms at the same date, 202,803; of which 303 contained 1000 acres or over; 1367 from 500 to 1000 acres; 65,940 from 100 to 500 acres; 68,130 from 50 to 100 acres; and 53,240 from 20 to 50 acres. The estimated total value of these farms was $920,506,346; of agricultural implements, $34,576,546; of farm products, $210,860,585; of orchard products, $3,571,789; of market gardens, $765,992; of animals sold for slaughter, $56,718,944; of home manufactures, $1,408,015; of forest products, $1,087,144; total, $1,379,252,100—an immense result for a state which, 70 years before, had only a little more than 12,000 inhabitants. In 1873 the value of the cultivated lands was estimated at $1,600,000,000; the actual property of the state, real and personal, at $2,800,000,000. The chief productions are wheat, corn, rye, oats, barley, flax, buckwheat, potatoes, sweet potatoes, tobacco, peas, beans, wool, cheese, hops, maple sugar, honey, and every variety of garden vegetables. The state in 1870 exceeded all others in the Union in the product of wheat, corn, and oats. It contained more swine and horses than any other state, and was exceeded by only New York in the aggregate value of its live-stock. The wheat crop of 1879 was estimated at 45,417,661 bush., valued at about $40,000,000. The corn crop of the same year was 54,664,569 bush., valued at $12,059,162.

In manufactures, by the census of 1870, Illinois ranked sixth among the states; in the value of the products of butchery, distilled liquors, planed lumber, and pork packed, she stood before all others. The number of her manufacturing establishments was 12,579; persons employed therein, 82,979, of whom 73,045 were men, 6,717 women, and 3,217 children; capital invested, $94,368,057; wages paid, $31,100,244; annual product, $205,620,672. The number of flouring-mills was 681; capital invested in them, $12,931,600; persons employed, 3,581; wages paid, $1,704,778; value of products, $39,413,618. Next in importance was the business of packing pork and other meats, the capital invested in which was $6,921,000; persons employed, 2,236; wages paid, $448,560; value of products, $19,818,851. In the manufacture of malt and distilled liquors 1955 persons were employed; wages paid, $1,031,142; capital invested, $7,397,900; value of productions, $12,042,976. The value of the lumber produced was $11,382,649; of agricultural implements, $8,880,390; iron wares, $7,738,443; clothing, $8,407,005; carriages and wagons, $6,019,291; machinery of all descriptions, $6,298,794; tobacco in its various forms, $4,319,716; leather, $4,148,163; woolen goods, $3,725,630; printing and publishing, $2,727,549; furniture, $2,982,592; coopering, $2,501,531; boots and shoes, $2,298,-

136; oils, animal and vegetable, $2,642,733; saddlery and harness, $2,581,416; sashes, doors, and blinds, $2,316,320; tin, copper, and sheet-iron wares, $2,194,812; confectionery goods, $1,948,710; bakery products, $1,732,885; bricks, $1,638,764; marble and stone work, $2,098,209; soap and candles, $1,250,930; grease and tallow, $1,412,900; paper, $1,188,400; railroad cars, $1,010,007.

The railroads of Illinois are more numerous and of a greater extent of track than those of any other state in the union. This is owing in part to the favorable situation of the state for commerce and travel, and partly to its almost level surface, which reduces the cost of construction to the lowest point. The total number of miles of railroad track in the state in 1874 was 6,116, occupying a space of nearly 60,000 acres, and valued, with right of way and improvements, at more than $40,000,000. The cost of equipping these roads is estimated at nearly $241,000,000; amount of preferred stock, $17,812,000; amount of common stock, $131,472,000; of bonded debt, $125,000,000; of floating debt, $4,180,000; gross earnings for the year, $43,188,000; operating and general expenses, $29,521,000; excess of earnings over expenses, $13,474,000; freight carried, 10,148,427 tons; number of passengers, 11,464,217. The most important of these roads, with their length in miles, are the following: the Illinois Central and its branches, 705; Chicago and Alton and branches, 548; Chicago, Danville and Vincennes, and branches, 783; Chicago, Rock Island and Pacific, 181; Cairo and Vincennes, 156; Indianapolis, Bloomington, and Western, 131; Indianapolis and St. Louis, 186; Ohio and Mississippi, 147; Rockford, Rock Island, and St. Louis, 318; St. Louis and Southeastern, 180; Springfield and Illinois Southeastern, 221; St. Louis, Vandalia, and Terre Haute, 158; Toledo, Peoria, and Warsaw, 230; Toledo, Wabash, and Western, 386; Western Union, 127. The Illinois Central pays to the state 7 per cent of its gross earnings, amounting to over $50,000 per annum, and is not otherwise taxed. The other roads pay taxes upon their assessed valuation. The companies are required to make written reports under oath, at stated intervals, and to obey the rules as to reasonable maximum rates of fare and of freight prescribed by commissioners appointed by the state.

In 1874 the debt of the state amounted to $1,706,750; indebtedness of some of the counties, cities, and towns, represented by outstanding railroad bonds, in 1870, $13,500,000; other indebtedness of counties, cities, and towns, $37,300,000. The commercial facilities of Illinois are scarcely rivaled by those of any other state. The Mississippi washes its whole w. boundary, while the Wabash and Ohio are navigable on one-half the e. and the whole of the s. boundary; the Michigan and Illinois canal, 100 m. long, connects lake Michigan, through the Chicago and Illinois rivers, with the Mississippi; while numerous railroads open the way for freight and passengers from every part of the state to the northern lakes and the Ohio and Mississippi rivers. The traffic through these channels is immense, and there are no recent statistics that give an approximate idea of its amount. Large quantities of Illinois production go to swell the commerce of St. Louis, Indianapolis, Louisville, and Cincinnati, while vast amounts are shipped directly and without breaking bulk to Boston, New York, Philadelphia, Baltimore, New Orleans, and San Francisco. The foreign commerce of the state, which is rapidly increasing, is chiefly carried on through the port of Chicago. There were in the state in 1874, 152 national banks with a capital of $20,338,670. There were also 12 state and savings banks doing a discount and deposit business, with a capital of $3,300,000, and 217 private banks. The insurance companies were mostly ruined by the Chicago fire of 1871, but new ones are rapidly taking their places. In 1873 eight new companies were in operation, with an aggregate capital of nearly $2,000,000, and assets amounting to $2,568,000. There were besides at the same time 6 life-insurance companies—all in Chicago—having an aggregate capital of $1,800,000, and assets amounting to $3,355,000. In 1879 the number of fire, marine, and inland insurance companies was 171. The state is as well supplied with telegraphs as with railroads, the lines extending in the aggregate more than 10,000 miles.

The census during four decades before 1840 showed the presence of a few slaves, introduced by emigrants from the southern states in defiance of the ordinance of 1787. Efforts were indeed made here, as in Indiana and Ohio, to treat that ordinance as a dead letter, and give slavery a foothold n. of the Ohio river, but they proved abortive. The pop. of Illinois in 1870 was 2,539,891, of which 2,024,693 were natives of the country, 515,198 of foreign birth, and 28,762 were colored; males, 1,316,537; females, 1,233,354. The charitable and correctional institutions of the state are: the penitentiary at Joliet, which has usually from 1200 to 1400 inmates; the reform school at Pontiac, with accommodations for but 150 inmates, too small for the public needs; the institutions for the deaf and dumb and the blind, at Jacksonville; the charitable eye and ear infirmary at Chicago; insane asylums at Jacksonville, Elgin, and Anna; the institution for the feeble-minded at Jacksonville; and the home for children of deceased soldiers at Normal. These institutions are under the supervision of a state board of commissioners, appointed by the governor with the consent of the senate. The public-school system is well organized and efficient. Appropriations of public money for sectarian schools are forbidden in the constitution. Every school district is required to maintain a free school during five months of every year, the tax for which is limited to 2 per cent for educational and 3 per cent for building purposes upon the assessed value of its taxable property. The elements of natural science are required to be a part of the common

school course. Teachers are required to produce a certificate of competency from the county superintendent. The amount of the state school fund in 1872 was $12,764,495. The total income from this fund and from the current school funds was $7,560,122. The income from current funds was derived chiefly from the two-mill tax and the ad-valorem tax in the districts—$900,000 from the former, and $5,292,942 from the latter. The number of school districts in 1872 was 11,231; of public schools, 11,376, of which 88 were high and 611 graded; number of teachers—male, 9,094; females, 11,820; average monthly salaries of teachers—males, $50; females, $39; total approximate value of school property, $19,876,708; number of volumes in district libraries, 54,286; number of private schools, 426, with 34,784 pupils. The number of persons in the state unable to read and write was 6,753. The state normal university at Normal for training teachers comprises, besides the usual departments, a model school. It employs from 12 to 15 instructors, and usually contains from 700 to 800 pupils, a large proportion of them in the model school. There is another normal university at Carbondale, in the s. part of the state, and, besides the two state institutions, there are county normal schools in Cook, Peoria, and Joe Daviess counties. In 1879 a law was enacted to enforce the attendance at school for at least 12 weeks in each year of every child between the ages of 8 and 14. According to the census of 1870 Illinois had 26 universities and colleges, with 223 instructors and 4,657 students; 32 academies, with 201 instructors and 4,590 pupils; 2 law schools, with 3 instructors and 61 students; 2 medical schools, with 19 instructors and 358 pupils; 9 theological schools, with 28 instructors and 555 students; 2 schools of agriculture, 2 of commerce, and 2 of art and music. There were in 1873 9 institutions for the superior instruction of girls, all but one under the patronage of some religious denomination; 2 of these are Roman Catholic, 2 Methodist, 2 Presbyterian, 1 Baptist, and 1 Congregational. The number of medical schools in 1873 was 6, with 89 instructors and 603 students; one of these schools was homeopathic. The theological schools in 1873 were of the following denominations: 2 Presbyterian, 2 Baptist, 1 Methodist, 1 Congregational, 1 Protestant Episcopal, 1 United Presbyterian, 1 Christian, and 1 Lutheran; instructors, 48; students, 260. The number of libraries, private and public, as reported by the census of 1870, was 13,570, containing 3,323,914 volumes. The Chicago fire of 1871 destroyed the largest of these libraries. The number of newspapers and other periodicals in 1870 was 505, circulating 113,140,492 copies annually. Of these publications, 39 were daily, 10 tri-weekly, 4 semi-weekly, 364 weekly, 11 semi-monthly, 72 monthly, 2 bi-monthly, and 3 quarterly. The religious organizations in 1870 numbered 4,298, having 3,459 church edifices, and property valued at $22,664,283. The leading denominations are: Baptist, Christian, Congregational, Episcopal, Friends, Jewish, Lutheran, Methodist, Presbyterian, Roman Catholic, United Brethren in Christ, Unitarian, and Universalist.

The present constitution of Illinois was adopted in 1870. The senate consists of 51 members, elected for 4 years; the house of representatives of 153 members, elected for 2 years. The legislative sessions are biennial. The governor and other executive officers (except the treasurer) are elected for 4 years, and cannot serve for two consecutive terms. The judicial department is composed of a supreme court, circuit courts, county courts, justices of the peace, and police magistrates. The supreme court, including the chief justice, is composed of 7 justices, each of whom is elected by the people of a judicial district for a term of 9 years. The chief justice is chosen by his associates. The circuit judges are elected for 6 years, the county and probate judges for 4 years. Voters must have resided in the state one year, in the county 90 days, and in the election district 30 days next preceding an election. The electoral votes of Illinois for president and vice-president have been cast as follows: 1820, 3 for Monroe and Tompkins; 1824, 2 for Jackson and 1 for Adams for president, and 3 for Calhoun for vice-president; 1828, 3 for Jackson and Calhoun; 1832, 5 for Jackson and Van Buren; 1836, 5 for Van Buren and R. M. Johnson; 1840, 5 for Van Buren and Johnson; 1844, 9 for Polk and Dallas; 1848, 9 for Cass and Butler; 1852, 11 for Pierce and King; 1856, 11 for Buchanan and Breckinridge; 1860, 11 for Lincoln and Hamlin; 1864, 16 for Lincoln and Johnson; 1868, 16 for Grant and Colfax; 1872, 21 for Grant and Wilson; 1876, 21 for Hayes and Wheeler; 1880, 21 for Garfield and Arthur.

ILLINOIS, the name of a community of tribes of Indians, partly belonging to the great Dakotah family, and inhabiting the territory which afterwards became the state of Illinois, and also lands w. of the Mississippi. They included the Kaskaskias, Peorias, Tamaroas, Moingwenas, Cahokias, and Michigameas, principally Algonquins. They were a warlike race, aided the French in their Indian wars, and fought the Sacs and Foxes on their own account. Only a remnant of this family exist, on reservation in the Indian territory.

ILLINOIS COLLEGE, at Jacksonville, Morgan co., Ill., was organized by Congregationalists as a non-sectarian institution in 1830. It has a library of 10,000 volumes. Number of professors in 1878, 9; number of students, 87.

ILLINOIS INDUSTRIAL UNIVERSITY, at Urbana, Champaign co., Ill., was organized in 1868, its chief endowment being derived from the public lands which fell to the share of the state of Illinois under the act of congress of July 2, 1862, and which were to be devoted to the establishment of colleges of agriculture and the mechanic arts. This endowment amounts to $320,000, and the university has 25,000 acres of land

still unsold, valued at from $5 to $10 per acre. Its annual income, derived from endowments, fees, and state appropriations, amounts to about $75,000. Its grounds, including the military campus, the college campus, and the farm, orchards, gardens, nurseries, arboretum, etc., embrace 623 acres. The main college building is one of the largest and best of its kind in the country, being four stories high and 214 ft. long, with a depth on the wings of 122 feet. It contains an auditorium, library, museum, art gallery, physical laboratory, and over thirty lecture-rooms. Besides this there are one large and two small dormitories, a large mechanical and military building, a large chemical laboratory, a green-house, and several farm houses and other farm buildings. The chemical laboratories contain desks and apparatus for 200 students; the physical laboratory has accommodations for 50 students; and there is besides a laboratory for students in mechanical engineering and architecture. There is a large museum of natural history, including zoological, geological, and mineralogical cabinets, agricultural and horticultural cabinets, collections for illustrations in mechanical and civil engineering, and a fine-art gallery, embracing over 400 casts of celebrated sculptures, a large collection of photographs and engravings from celebrated paintings, and a gallery of historical portraits. The library in 1880 included about 12,200 bound volumes and nearly 2,500 pamphlets. The corps of instructors at the same date included 17 professors, and 10 teachers and assistants. Number of students, 399; alumni, 227. The university is organized in four departments, viz.: literature and science, engineering, natural science, and agriculture. These embrace respectively the schools of ancient, English, and modern languages; mechanical, civil, and mining engineering, and architecture; chemistry, natural history, domestic sciences, and agriculture and horticulture. Women are admitted to all the courses of study. Military training, heretofore given to all male students, is hereafter to be confined to those of the first two years. There is a gymnasium for men and a calisthenic hall for women. J. M. Gregory, LL.D., regent, resigned in 1880, and S. H. Peabody, PH.D., is the acting regent.

ILLINOIS AND MICHIGAN CANAL, an artificial navigable water-course connecting lake Michigan and the navigable waters of the Illinois river, and allowing of the passage of vessels from the gulf of Mexico to the gulf of St. Lawrence by using also the Welland canal, which forms a navigable channel from lake Erie to the St. Lawrence river. In 1825 it was estimated that the canal, about 100 m. in length, would cost about $700,000. In 1833 new surveys and estimates were made placing the cost of a canal 40 ft. wide and 4 ft. deep at $4,043,000; but nothing definite was attempted till 1836, when the plan was altered and estimates were made for a canal 60 ft. wide at the surface, 36 ft. at the bottom, and 6 ft. deep, costing $8,654,000. Work was commenced in June, 1836, and continued till Mar., 1841, when it was discontinued for want of available funds. In 1845 an additional $1,800,000 was raised by the sale of lands owned by the canal. It must here be stated that in consequence of a change of plans the entire cost fell within the estimates which had been made, so that at the opening of the canal in April, 1848, the entire expenditure had been $6,170,226. When completed the eastern terminus joined the s. branch of the Chicago river, five m. from the mouth of the main stream. A direct line is pursued to the valley of the Des Plaines, the main eastern branch of the Illinois river, a distance of about 8 miles. It then traverses the valley to the mouth of the Kankakee river, a distance of 42 m., passing through the towns of Lockport and Joliet, and receiving water from four feeders, Calumet, Des Plaines, Du Page, and Kankakee rivers. The canal now follows the valley of the Illinois river to its terminus, La Salle, passing through the towns of Morris and Ottawa, receiving water from Fox river; the whole length being 96 miles. The water at La Salle is 145 ft. lower than lake Michigan, and the descent is accomplished by means of 17 locks, varying in lift from 3½ to 10 feet. The locks are 110 ft. long by 18 wide, giving passage to boats of 150 tons. One effect contemplated and secured by this great work has been the purification of the water in the Chicago river, formerly almost stagnant, with a scarcely perceptible current into lake Michigan, and retaining much of the sewage of the great city; but now flowing freely in the opposite direction toward the Mississippi and the gulf of Mexico.

ILLUMINATED MANUSCRIPTS. See MANUSCRIPTS.

ILLUMINATI, a name which has at different periods been borne by four different societies—that of the *Alombrados* in Spain, in the end of the 16th c.; that the *Guerinets* in France, about the year 1684, enthusiasts and visionaries; an association of mystics in Belgium, in the latter half of the 18th c.; and the *Order of the Illuminati*, which was founded at Ingolstadt on May 1, 1776, and soon spread over almost all the Roman Catholic parts of Germany. It is this which is now commonly meant when the name illuminati is employed. Its founder at first called it the order of the perfectibilists. It owed its existence to Adam Weishaupt, professor of canon law at Ingolstadt, a man of superior abilities and much benevolence, but deficient in practical knowledge of mankind. Filled with detestation of Jesuitism, and impatient of the restraints which were at that time imposed on the human mind in Roman Catholic Germany, and in no part of it more than in Bavaria, under the bigoted administration of the elector Charles Theodore, he conceived the idea of forming an association which should extend its ramifications everywhere, and should consist of the choicest spirits, should labor for the establishment of the dominion of reason, and promote religious and political enlighten-

ment and emancipation. Religious dogmas and forms of worship were to be rejected, a system of deism was to be propagated, and republican opinions. The accession of the Baron von Knigge to the new order, and the support which it received from the Freemasons, led to its rapid extension, so that, at one time, more than 2,000 of the most accomplished men in Germany were members of it. Weishaupt's knowledge of the order of the Jesuits led him to borrow some of their methods for the accomplishment of what he regarded as the most opposite ends; and the illuminati were soon involved in a system of mutual espionage, confession, and the like, essentially inconsistent with true freedom, but calculated to place the threads all in one hand, by which the holy legion was to be led on, as it was imagined, to the benefaction of mankind. But from this cause, the dissolution of the order soon ensued. Weishaupt and Knigge, its two leaders, quarreled with one another. The order began to be openly denounced as dangerous, and, on June 22, 1784, an edict was issued by the elector of Bavaria for its suppression, which was followed by another March 2, 1785. Weishaupt was degraded and banished. He retired to Halle, where he died in 1830, at the age of 83. Various other members were severely punished, and the form of justice was not strictly observed in the proceedings against them.—Great importance was at one time attached to the order of the illuminati, whose secret influence was regarded as a principal cause of many of the political events of the time of the French revolution, and the works of abbé Barruel and of prof. Robison of Edinburgh upon this subject were eagerly read, but the highly exaggerated character of their views is now generally acknowledged.

ILLUPIE. See BASSIA.

ILLUSORY APPOINTMENT, a legal phrase which denotes that where a person has a power or faculty to divide property among several others, such as children, and he gives one or more a very small sum, and the bulk of the property to the rest, the former is called an illusory appointment. In vulgar parlance, it is like cutting off an heir or child with a shilling. In general, it is competent, both in England and Scotland, to make an illusory appointment, but much depends on the peculiar terms of the deed or will originally giving this power to appoint or divide.

ILLUSTRATED PUBLICATIONS are a remarkable feature of the literature of our times. The employment of illustrations or pictorial sketches to render books more intelligible and attractive, has long been common, but has of late years been carried to an extent previously unknown. There are two methods of illustration: by copper or steel-plate engravings, which, being on leaves apart from the text, are executed separately; and by wood-engravings, which, inserted as blocks in the typography, are printed as part of the work. Wood-engraving is not new, but it was little employed for general illustration until comparatively recent times. Throughout the 18th and the first quarter of the 19th c., illustrations, for the most part, consisted of separate engravings on copper. See ENGRAVING. In the early part of the 19th c., books of travels and works of a fanciful kind, and also in natural history, issued in London, were illustrated chiefly by aquatint engravings. Among the artists who were noted for this species of illustration were Rowlandson, John Clark, and the Cruikshanks, and as the engravings were colored by hand, they were particularly attractive. Clark was principally employed to illustrate voyages and travels. In the preparation of designs for these illustrations, the author of the work was usually much indebted to the artist, who, in many cases, was furnished with only a few scratches to guide him in his representations. The use of aquatint engravings was at length superseded by lithography; but before this new species of illustration came greatly into vogue, wood-engraving took the place of all kinds of illustration except that of the high-class line steel-engravings, which are still in use for costly publications. The taste for illustrated works first sprung up in England, and thence it extended to France, Germany, and the United States. From 1820 to about 1830 was the great era of illustrated annuals (q.v.). The taste for these illustrated year-books ultimately wore itself out, and was succeeded by a demand for highly illustrated books of poetry by popular authors, such as Rogers, Byron, and Campbell, and in the disposal of these elegant works, some publishers realized handsome fortunes. Latterly, illustration has consisted for the greater part in wood-engravings, for they possess the inestimable advantage of being printed with the letter-press, and in the hands of high-class artists, the design and execution of these embellishments have reached extraordinary perfection. Executed with comparative cheapness and rapidity, wood-engravings have been largely employed to illustrate popular periodicals, encyclopædias, and newspapers. *The Illustrated London News*, which was the first, is still the leading illustrated paper; *The Graphic*, a more recent publication, is its chief rival. See WOOD-ENGRAVING.

ILLYRICUM (Gr. ILLYRIS, ILLYRIA) is the Roman name of a country whose limits in ancient times varied very considerably. In the 4th c. B.C. the Illyrians, who are the ancestors of the modern race generally known as Albanians (see ALBANIA), inhabited the whole eastern coast of the Adriatic sea and adjacent islands, with the western parts of Macedonia as far as Epirus. Philip of Macedon conquered the country as far as the river Drilon (modern Drino), and thence arose the division into *Illyris Græca* and *Illyris Barbara* or *Romana*. The former, now Albania (q.v.), was incorporated with Macedonia. *Illyris Barbara* or *Romana* was divided into Iapydia, Liburnia, and Dalmatia. The Illyrians were much addicted to piracy, which soon brought them into collision with the

Romans, and led to their subjugation about two centuries B.C. They made numerous efforts to shake off the Roman yoke, but were always defeated, and the country became a most important province of the Roman empire, comprising the territory represented in modern times by Croatia, Dalmatia, Herzegovina, Montenegro, nearly all Bosnia, and a part of Albania. On the division of the Roman empire Illyricum shared in the vicissitudes that followed that act. A decree of Napoleon, Oct. 14, 1809, gave the name of Illyrian provinces to Carniola, Dalmatia, and other countries from the Adriatic sea to the Save, then belonging to the French empire. At his fall, these provinces were united as a kingdom to the Austrian empire, and some alterations were made in its boundaries, especially by the restoration to Hungary of what had formerly belonged to it, and the annexation of the whole of Carinthia instead. The kingdom was divided into the two governments of Laibach and Triest, Laibach being the capital, which arrangement subsisted till 1849, when it was subdivided, for administrative purposes, into the duchies of Carinthia (q.v.), Carniola (q.v.), and the coast district, containing the counties of Görz (q.v.), Gradiska, and Istria (q.v.), with the city and territory of Triest (q.v.).

IL'MEN (formerly *Moysk*), a lake in n.w. Russia, government of Novgorod, 27 m. long, 20 m. broad, and 16 ft. deep. The lake is stormy, and unfit for navigation; its bottom stony. The rivers Shelon, Lovat, Msta, and several others, flow into the lake, which discharges its waters through the river Volkhof into lake Ladoga. The lake abounds in fish, chiefly sandres, bream, and smelt, and fishing on its banks occupies a population of about 20,000. The lake Ilmen is historically remarkable, because it was on its banks that the Slavonian tribes lived, who, a thousand years ago (862), invited the Variago-Russ to come and rule over them, from which time dates the origin of the Russian nation.

ILMEN'IUM, the name applied by Hermann to a new metal analogous to tantalum. He obtained its oxide from a mineral to which the various names of *urano-tantalite*, *samarskite*, and *yttro-ilmenite* have been applied, and which occurs in the Ilmen mountains in Siberia. Its existence as an independent metal is not satisfactorily established.

IL'MINSTER, a small but ancient market-t. of England, in the co. of Somerset, is situated on the right bank of the Isle, 44 m. s.w. of Bath. The free grammar and commercial schools, with an endowment of nearly £1000 a year, were founded in 1586. Some manufactures of woolens, silks, and lace are carried on. Pop. '71, 2,431.

IL OBEID', or EL OBEID (pronounced *Lobeid*), an important trading t. of Africa, capital of Kordofan, is situated in lat. 13° 11′ n., long. 29° 35′ e., at the foot of a long and gradually sloping plain, the drainage from which, after heavy rains, frequently inundates the principal streets. The town consists of a number of villages, originally separate, and inhabited by distinct races, but now joined together, and only distinct enough to form separate quarters. The houses and mosques, as well as the government offices, are almost all built of a fragile clay, and the general appearance of the place is uninviting, gloomy, and dirty. The *zoog*, or market-place, contains four rows of booths, and fruit, vegetables, tobacco, and manufactures in iron and wood are here sold. The wholesale trade is carried on in private houses. Gum-arabic, ivory, tamarinds, and ostrich feathers are the chief articles of export. Pop. estimated at about 30,000.

ILOPANGO, a lake of Central America, in the republic of San Salvador, of volcanic origin, 14 m. long, 6 m. wide. It is situated in a fertile and beautiful plain surrounded by high hills.

ILO'RI, ILO'RIN, or, more properly, ALORI, a very large t. of Africa, the great center of the Fulbe, in Yóruba, is situated in lat. 8° 30′ n., and long. 4° 33′ e., 46 m. s.w. of the banks of the Niger, and about 150 m. n.e. from the shore of the bight of Benin. Nothing very definite seems to have been published regarding it. Dr Barth, in conversing about Ilori with an intelligent native who had lived for a long time in Constantinople, was told that it was "without the least doubt larger than the latter city."

IL'SLEY, EAST, a small but ancient market t. of Berkshire, England, is situated in a secluded valley amid bleak and dreary downs, about 56 m. w. of London. It is remarkable chiefly for its sheep-markets, which are among the most important in the kingdom; 50,000 sheep have been known to be penned for sale here in one day. The ordinary sheep-fairs are held on every alternate Wednesday, from the Wednesday fortnight before Easter till July. The downs in the vicinity of the town are celebrated as training-grounds for race-horses. About a mile distant is the village of West Ilsley. Pop. '71, 608.

IMAGE-WORSHIP (Gr. *iconolatria*), the use, in public or private worship, of graven or painted representations of sacred persons or things, and especially the exhibition of honor, reverence, or worship to or towards such representations. This practice, in the various degrees of which it is susceptible, has formed, for many centuries, so fruitful a subject of controversy among Christians, that we think it expedient first briefly to detail the history of the use of images in Christian worship during the several periods, and secondly to state summarily the opposite views of this history which are taken by the two great parties into which Christians are divided on the question.

Neither in the New Testament, nor in any genuine writings of the first age of Chris-

tianity, can any trace be discovered of the use of statues or pictures in the worship of Christians, whether public or private. The earliest allusion to such representations is found in Tertullian, who appeals to the image of the Good Shepherd as engraved upon the chalices. A very curious pagan caricature of Christianity, of the very same age, lately discovered scratched upon the wall of a room in the palace of the Cæsars (see GRAFFITI), which rudely represents a man standing in the attitude of prayer, with outstretched hand, before a grotesque caricature of the crucifixion, and which bears the title "Alexamenus worships God," has been recently alleged by Catholics as an additional indication of at least a certain use of images among the Christians of the 2d century. The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven upon them representations of the dove, of the cross, of the symbolical fish, of the ship, of Adam and Eve, of Moses striking the rock, of Jonas, of Daniel in the lions' den, of the apostles Peter and Paul, and above all, of the Good Shepherd; and those compartments of the catacombs which were used as chapels are often profusely decorated with sacred representations, the age of which, however, it is not easy to determine with accuracy. But whatever opinion may be formed as to particular instances, such as these, it is admitted by Catholics themselves (who explain it by the fear of perpetuating the idolatrous notions of the early converts from paganism) that for the first three centuries the use of images was rare and exceptional; nor was it until after the establishment of Christianity under Constantine, and particularly after the condemnation of the Nestorian heresy in 430, that statues and pictures of our Lord, of the Virgin Mary, and the saints, were commonly introduced in churches, especially in the east and Italy. And yet, even in the 5th c., the practice had already reached a great height, as we learn from the church historian, Theodoret, for the east, and from Paulinus of Nola, for Italy; and in the 6th and 7th centuries many popular practices prevailed which called forth the condemnation of learned and pious bishops both in the east and in the west. It was usual not only to keep lights and burn incense before the images, to kiss them reverently, and to kneel down and pray before them, but some went so far as to make the images serve as godfathers and godmothers in baptism, and even to mingle the dust or the coloring matter scraped from the images with the eucharistic elements in the holy communion! This use of images by Christians was alleged as an obstacle to the conversion of the Jews, and as one of the causes of the progress of Mohammedanism in the east; and the excesses described above provoked the reaction of iconoclasm (q.v.). In the second council of Nice, 787, the doctrine as to the worship of images was carefully laid down. A distinction was drawn between the supreme worship of adoration, which is called *latreia*, and the inferior worship of honor or reverence, called *douleia;* and still more between *absolute* worship, which is directly and ultimately rendered to a person or thing *in itself;* and *relative*, which is but addressed *through* a person or thing, ultimately *to* another person or thing represented thereby. The second council of Nice declared, first, that the worship to be paid to images is not the supreme worship of *latreia*, but only the inferior worship of *douleia;* and, secondly, that it is not *absolute*, and does not rest upon the images themselves, but *relative*, that is, only addressed through them, or by occasion of them, to the original which they represent. This explanation of the doctrine and the practice was thenceforth generally received; but a strange error in the translation of the Greek acts of the council of Nice, by which it appeared that the same adoration was decreed by that council to images "which is rendered to the Holy Trinity itself," led to a vehement agitation in France and Germany under Charlemagne, and to a condemnation by a synod at Frankfort of the doctrines of the council of Nice. But an explanation of this error, and of the false transation on which it was based, was immediately afterwards given by the pope; and eventually the Nicene exposition of the doctrine was universally accepted in the western as well as in the eastern church.

At the reformation the reforming party generally rejected the use of images as an unscriptural novelty, irreconcilable as well with the prohibition of the old law as with that characteristic of "spirit and truth" which is laid down by our Lord as specially distinctive of the new dispensation: and they commonly stigmatized the Catholic practice as superstitious, and even idolatrous. The Zwinglian, and subsequently the Calvinistic churches, absolutely and entirely repudiated all use of images for the purposes of worship. Luther, on the contrary, while he condemned the Roman worship of images, regarded the simple use of them even in the church, for the purpose of instruction, and as incentives to faith and to devotion, as one of those *adiaphora*, or *indifferent* things, which may be permitted, although not of necessary institution; hence, in the Lutheran churches of Germany and the northern kingdoms, pictures, crucifixes, and other religious emblems are still freely retained. In the Anglican church the practice is still a subject of controversy. In the Presbyterian church, and in all the other Protestant communions, images are entirely unknown.

The Roman Catholic church, through the decree of the council of Trent, disclaims the imputation, commonly made against Catholics, of the idolatrous worship of images, "as though a divinity dwelt in them, or as though we [Catholics] asked anything of them, or trusted in them, as the heathens did in their idols." It renews the Nicene distinction between *absolute* and *relative* worship; the latter of which alone—"whereby we worship Christ and the saints, who are the prototypes of these images"—it sanctions or permits; and it contends for the great advantage, especially for the rude and unlearned

people, to be drawn from the use of pictures and statues in the churches as "memorials of the sufferings and of the mercy of our Lord, as instructive records of the virtues of the saints, and exhortations to the imitation of their example, and as incentives to the love of God and to the practice of piety" (Sess. xxv. *On the Invocation of Saints*). In many foreign churches, especially in Italy, in Southern Germany, and in France, are to be found images which are popularly reputed as especially sacred, and to which, or to prayers offered before which, miraculous effects are ascribed. But instructed Catholics declare that the legends connected with such images form no part of Catholic belief. Most Catholic books of instruction contain cautions against attributing such effects to any special virtue of the images themselves, rather than to the special faith, trustfulness, and fervor which are stirred up by their presence, and by the recorded examples of the mercy of God with which they are associated in the minds of the faithful.

IMAGINARY QUANTITY. In the working of many algebraic problems, it often happens that the root of a negative quantity must be extracted; if the root is odd, the operation can be performed (see INVOLUTION), but if even, the root can only be *formally* extracted, and is in consequence called an *impossible* or *imaginary* quantity. For instance, the cube root of -64 is not an imaginary quantity, for $-4\times-4\times-4=-64$, and therefore $\sqrt[3]{-64}=-4$; but the square root of -64 is an impossible quantity, for no possible quantity (whether it be $+$ or $-$) multiplied by itself can produce a negative quantity; similarly and *à fortiori*, the fourth root of -64 is an impossible quantity, and the same is true of all even roots. Imaginary quantities are, however, generally reduced to one denomination as multiples of $\sqrt{-1}$, in the following manner: $\sqrt{-64}=\sqrt{64\times-1}=\sqrt{64}\times\sqrt{-1}=8\sqrt{-1}$; and again, $\sqrt{-18a^5}=\sqrt{9a^4\times-2a}=\sqrt{9a^4}\times\sqrt{2a}\times\sqrt{-1}=3a^2\sqrt{2a}\sqrt{-1}$. These forms very frequently occur in higher algebra.

IMAGINATION. The meaning of this word enters into many relationships, and is thereby rendered difficult to define. The principal meaning is doubtless what connects it with poetry and fine art, from which the other significations branch off. The simplest mode of explaining this complicated relationship will be to state in separation the different constituents of the power in question. We shall then see why and where it touches upon other faculties, which still require to be distinguished from it.

1. Imagination has for its objects the *concrete*, the real, or the individual, as opposed to abstractions and generalities, which are the matter of science. The full coloring of reality is implied in our imagination of any scene of nature. In this respect there is something common to imagination and memory. If we endeavor to imagine a volcano, according as we succeed we have before the mind everything that a spectator would observe on the spot. Thus, sensation, memory, and imagination alike deal with the fullness of the actual world, as opposed to the abstractions of science and the reasoning faculties.

The faculty called *conception*, in one of its meanings, has also to do with this concrete fullness, although, in what sir William Hamilton deems the original and proper meaning of that word, this power is excluded. In popular language, and in the philosophy of Dugald Stewart, conception is applied to the case of our realizing any description of actual life, as given in history or in poetry. When we completely enter into a scene portrayed by a writer or speaker, and approach the situation of the actual observer, we are often said to *conceive* what is meant, and also to imagine it; the best word for this signification probably is "realize."

2. It is further essential to imagination in its strictest sense that there should be some original construction, or that what is imagined should not be a mere picture of what we have seen. Creativeness, origination, invention, are names also designating the same power, and excluding mere memory, or the literal reproduction of past experience. Every artist is said to have imagination according as he can rise to new combinations or effects different from what he has found in his actual observation of nature. A literal, matter-of-fact historian would be said to be wanting in the faculty. The exact copying of nature may be very meritorious in an artist, and very agreeable as an effect, but we should not designate it by the term imagination. There are, however, in the sciences, and in all the common arts, strokes of invention and new constructions, to which it might seem at first sight unfair to refuse the term in question, if originality be a leading feature in its definition. But still we do not usually apply the term imagination to this case, and for a reason that will appear when we mention the next peculiarity attaching to the faculty.

3. Imagination has for its ruling element some *emotion* of the mind, to gratify which all its constructions are guided. Here lies the great contrast between it and the creativeness of science and mechanical invention. These last are instrumental to remote objects of convenience or pleasure. A creation of the imagination comes home at once to the mind, and has no ulterior view.

Whenever we are under the mastery of some strong emotion, the current of our thoughts is affected and colored by that emotion; what chimes in with it is retained, and other things kept out of sight. We also form new constructions that suit the state of the moment. Thus, in fear, we are overwhelmed by objects of alarm, and even conjure up specters that have no existence. But the highest example of all is presented to us by the constructions of fine art, which are determined by those emotions called *æsthetic*, the sense of beauty, the pleasures of taste; they are sometimes expressly styled

"pleasures of the imagination." The artist has in himself those various sensibilities to an unusual degree, and he carves and shapes his creations with the view of gratifying them to the utmost. Thus it happens that fine art and imagination are related together, while science and useful art are connected with our reasoning faculties, which may also be faculties of invention. It is a deviation from the correct use of language, and a confounding of things essentially distinct, to say that a man of science stands in need of imagination as well as powers of reason; he needs the power of *original construction*, but his inventions are not framed to satisfy present emotions, but to be instrumental in remote ends, which in their remoteness may excite nothing that is usually understood as emotion. Every artist exercises the faculty in question if he produces anything original in his art.

The name "fancy" has substantially the meanings now described, and was originally identical with imagination. It is a corruption of fantasy, from the Greek *fantasia*. It has now a shade of meaning somewhat different, being applied to those creations that are most widely removed from the world of reality. In the exercise of our imagination we may keep close to nature, and only indulge the liberty of re-combining what we find, so as to surpass the original in some points, without forcing together what could not co-exist in reality. This is the sober style of art. But when, in order to gratify the unbounded longings of the mind, we construct a fairyland with characteristics altogether beyond what human life can furnish, we are said to enter the regions of fancy and the fantastical.

The "ideal," and "ideality," are also among the synonyms of imagination, and their usual acceptation illustrates still further the property now discussed. The "ideal" is something that fascinates the mind, or gratifies some of our strong emotions and cravings, when reality is insufficient for that end. Desiring something to admire and love beyond what the world can supply, we strike out a combination free from the defects of common humanity, and adorned with more than human excellence. This is our "ideal," what satisfies our emotions, and the fact of its so doing is the determining influence in the construction of it.

IMAUM', the appellation given to the most honored teachers of Mohammedanism. The word is Arabic, and signifies a director or teacher. It is commonly employed to designate any of the persons belonging to the Mohammedan ulema (q.v.), or priestly body. They are distinguished from the laity by a turban somewhat higher than usual. They are held in great reverence by the people. The sultan himself has the title of imaum, as the spiritual chief of all Moslems. The word is sometimes incorrectly written imaun.

IMAUS. See HINDÚ-KÚSH.

IMBATTLED. See EMBATTLED.

IMBECILITY must not be confounded with idiocy. In the former, there is the *imperfect* development of mind; in the latter, there is the *non*-development of mind. In the feeble intellect there may be present every faculty which distinguishes the most gigantic understanding, and these may act under ordinary laws, but they are dwarfed, incapable of continued growth and training, and are exercised and applied under the guidance and assistance of others, or of external circumstances. There are large numbers of weak-minded, useless persons in every community, who differ from the more robust intellects solely in degree. But the more marked and recognizable imbecility, as transmitted congenitally, as following dentition, chorea, convulsions, and diseases which retard vigorous bodily development, or as induced by the great constitutional changes at puberty, is characterized by all or many of the following symptoms. The expression is vacant, the senses are dull; the head is small, the body deformed; the gait is vacillating and restless; the head is pendent, thrown back, or agitated; the saliva escapes; the language is limited and infantile; the ideas are few, and consist of mere sensuous impressions; the temper is timid, facile, and vain; and the passions are little susceptible of control. The affection has been regarded as general, or involving the whole mind; or as partial, when the intellect only, or the sentiments only, or a particular faculty may be feeble and ineducable. In a legal view such persons have been divided into those who have, and those who have not, a moral perception of right and wrong. It is, however, worthy of consideration, that while they may know right from wrong in their ordinary and habitual range of duties, and within the scope of their own capacity, they may fail to do so beyond these narrow limits, and where questions of property, propriety, or abstract justice are concerned. Many imbeciles are muscular, capable of performing acts requiring strength and endurance rather than dexterity; and in this country, as well as many others, they are not merely the "naturals," who run everybody's messages, but they are converted into the domestic drudges of the homestead, the white slaves of the farm. From the more clever and cunning of the class were the professional fools of former ages selected. Imbeciles are often confounded with genuine idiots, and their partial educability has exaggerated the supposed success in the attempts to elicit and mature the embryo mind. However far this training may be carried, and even when the subject has become self-maintaining, it may be safely asserted that he is never self-guiding nor self-governing, nor capable of an independent existence.—Howe, *On the Causes of Idiocy*; Reports, Idiot School, Earlswood; *De l'Idiotie chez les Enfants*, par Felix Voisin.

IMBECILITY, in point of law—i.e., something short of idiocy or lunacy—is no ground of relief in England against a contract, though relief is always granted in case of fraud, and the imbecility of one of the parties may form an element of the fraud. Nor does the law of England in any peculiar way protect an imbecile person or his property; for so long as a person is not actually insane or an idiot, he can do what he likes with his own. In Scotland, however, an imbecile person is to a certain extent protected against being imposed upon, as regards his heritable property, by a step called interdiction, which consists in either the imbecile, who is conscious of his weakness, executing a bond of interdiction, by which he puts himself under trustees, whose consent is in future made necessary to render valid his contracts, or he may be judicially interdicted by the court of session, at the instance of his next of kin, with like effects. The trustees or guardians in such cases are called the interdicters. See LUNACY.

IMBER, or IMMER. See DIVER.

IMBERT, BARTHELÉMI, 1747–90; b. Nismes, France. His poem, *Le Jugement de Paris*, was for a time very successful, but with the exception of his *Choix d'Anciens Fabliaux*, 2 vols. in verse, none of his works are of much value.

IMBROS, an island of the Ægean sea, about 11 m. n.e. of Lemnos, and the same distance from the mouth of the Dardanelles. It is 18 m. in length, and has an area of 116 sq. miles. The island is mountainous, its highest summit being 1845 ft. above sea-level, and is covered with wood. Corn, wine, and cotton are abundantly grown in the valleys; oil is also produced. Imbros contains four villages, the chief of which, called Imbro, is built on the site of an ancient town of the same name. Pop. of entire island about 4,000.

IMBRU'ED, or EMBRUED, an expression used in heraldry to signify bloody, or dropping with blood. Weapons thus blazoned are drawn with drops of blood falling from them.

IMERI'TIA, formerly an independent Transcaucasian territory, now part of the government of Kutaïs (see TRANSCAUCASIA), is bounded on the n. by the Caucasian mountains, and on the w. by the districts of Ghuria and Mingrelia. Area, 4,040 sq.m.; pop. 100,000. Its history as an independent dominion commenced from about the beginning of the 15th c., and was long marked by internal dissensions. In 1745 Salomon I. was proclaimed, but his nobles revolting shortly after, and aided by the Turks, dethroned him. Salomon applied for help to Russia, and in 1769 Count Todtleben, at the head of a Russian force, entered Imeritia, restored the king, and drove back the Turks. The civil dissensions of this province, however, continued, and at last, in 1810, after having long acknowledged allegiance to Russia, it was formally incorporated in and proclaimed a province of that empire.

IMIDES. See ORGANIC BASES.

IMITA'TION. See SYMPATHY.

IMITATION, in the science of musical composition, is the repeating of the same passage, or the following of a passage with a similar one, in one or more of the other parts or voices, and it may be either strict or free. When the imitated passage is repeated note for note, and every interval is the same, it is called strict, and it may take place in the unison or octave, or in any other of the degrees of the scale, either above or below the original passage. The progression of a passage may also be imitated by an inversion, or by reversing the movement of the original; also by notes of a greater or of a lesser value. See DOUBLE COUNTERPOINT, FUGUE, and CANON. Imitation in composition is one of the most important means of producing unity and animation in the progression of the parts, and is used in a strict, and also in a free manner, in the instrumental works of Haydn and Beethoven, and also by Mozart in his easier operatic works. Many composers, however, resort to imitation improperly, and generally from poverty of musical ideas, or from pedantry. No fixed rules can be given for its use.

IMITATIVE INSANITY. There are many mental diseases, especially those marked by grotesque external manifestations, by gesticulations, and convulsive seizures, which appear to be propagated by imitation. In the healthy and naturally constituted there exists a tendency to copy and reproduce, or represent what powerfully impresses the imagination; and during the excitement of individuals or communities, this inclination is more influential, and passes beyond the control of the will. Great caution, however, must be exercised in distinguishing between what is epidemic and depends upon atmospheric or external moral causes, from the results of strong or morbid states of the mind itself. An idiot is mentioned by Gall, who, having seen the slaughter of a pig, killed a man after the same fashion. A child of seven years old suffocated a younger brother on the suggestion of the strangling of Punch at the hands of the devil. The example of suicide by hanging having been set by a pensioner in the Hôpital des Invalides, six similar deaths followed, and by suspension from the same lamp-post. After the return of the Bourbons, there appeared in succession seven female claimants to the parentage of Marie Antoinette; and pyromania, propagated by sympathy, is well known to have existed in Normandy in 1830.

IMMACULATE CONCEPTION OF THE BLESSED VIRGIN MARY, FEAST OF, a festival celebrated on Dec. 8th in the Latin, and on the 9th in the Greek church, in which latter

church it is held under the name of "The Conception of St. Anne," the mother of the Virgin Mary. The festival of the conception itself is traceable in the Greek church from the end of the 5th c., and in the Latin dates from the 7th; but a great controversy prevailed for a long time in the west as to whether and in what sense the conception of the blessed Virgin Mary was to be held immaculate, and in what sense the blessed Virgin herself was to be held conceived without sin. It was believed to be a consequence of the doctrine of the divine maternity, and a necessary part of the honor due to the incarnation, that the blessed Mother should be held to have been at all times free from the stain of sin. This might have been, either by her having been, like the prophet Jeremiah (Jer. i. 6), or the baptist St. John (Luke i. 35), sanctified before her birth—that is, purified in her mother's womb from the stain of original sin; or by the still higher sanctification of having been entirely exempted from the stain of sin, either—for the discussion was carried to all these subtleties—before the formation of the embryo in the womb of her mother, or at least before its animation by union with the soul. The actual controversy in the west may be said to have commenced with St. Bernard, who not only remonstrated with the canons of Lyons in 1131 for their unauthorized introduction of this festival in their cathedral, but rejected the opinion of the blessed Virgin's having been conceived free from original sin, though he admitted her sanctification in her mother's womb (*Epist.* 174, *Ad Canon. Lugdunensis*). The discussion thus raised led to a protracted controversy in the schools. The great master of scholastic subtlety, John Duns Scotus, in a disputation held before the university of Paris in 1307, maintained the doctrine of the immaculate conception in its highest sense; and the entire order to which he belonged, the Franciscan, as well as the school to which he has given his name, the Scotists, afterwards zealously defended it. On the other hand, the Thomist school, which was that of the Dominican order, having denied the immaculate conception, much division for a time existed; but the prevailing tendency was at all times towards the Scotist opinion. The university of Paris, in 1387, condemned the Thomist doctrine. The council of Basel, although, it is true, at the time when it was in conflict with the pope—declared the doctrine of the immaculate conception to be a Catholic dogma, and reprobated in the strongest terms the opposite opinion. Sixtus IV., however, imposed on the defenders of both opinions, in 1470, the obligation of mutual toleration and charity, and renewed this constitution in 1483; but in the end of the same century the university of Paris required, as a condition of the doctorate, an oath on the part of the candidate that he would defend the dogma of the immaculate conception. The council of Trent, without discussing the scholastic dispute, merely declared that "in its decree on original sin it did not comprehend the blessed and immaculate Virgin Mary," and renewed the constitution of Sixtus IV., already referred to. This abstinence on the part of the council led to a further renewal of the dispute, which reached such a pitch towards the close of the 16th c. that Pius V. not only prohibited either side from stigmatizing the opposite with the name of heretical, but forbade all public discussions of the subject, except in theological disputations in the presence of a learned auditory. In the pontificates of Paul V. and Gregory XV., earnest instances were made by the Spanish crown to obtain a definite declaration in favor of the doctrine of the immaculate conception; but the pope again refused, contenting himself with repeating the constitution of Sixtus IV. He added, however, certain new provisions: 1. That disputants, in asserting the doctrine of the immaculate conception, should abstain from assailing the opposite doctrine. 2. That no one except the members of the Dominican order, and others specially privileged, should presume to defend, even in private disputation, the doctrine that the blessed Virgin Mary was conceived in original sin. 3. That, nevertheless, in the public mass or office of the church no one should introduce into the prayers or other formularies any other word than simply *conceptio*, without adding any epithet involving either doctrine. At the same time, opinion was setting steadily in favor of the doctrine of the immaculate conception. Alexander VII., and afterwards Clement IX., added new solemnity to the festival. Clement XI. ordained that it should be observed as a holiday of obligation, and at length Gregory XVI. permitted that the epithet immaculate should be introduced into the public service. In the end, at the instance of bishops in various parts of the church, the late pope Pius IX. addressed a circular to the bishops of each nation, calling for their opinion, and that of their people, as to the faith of the church on the point; and on the receipt of replies all but absolutely unanimous, he issued a solemn decree at Rome, in a numerous council of bishops, on Dec. 8, 1854, declaring the doctrine to be an article of Catholic belief, and proposing it as such to the universal church. This decree has been implicitly accepted throughout the Roman church.

IMMANUEL. See EMMANUEL.

IMMERMANN, KARL LEBRECHT; 1796–1840; b. Germany. Though educated for civil service, and active in political matters in 1815, he devoted himself chiefly to poetry and the drama. His unsuccessful attempt to manage the Düsseldorf theater occasioned a heavy pecuniary personal loss. His tragedies and comedies, though of great merit, were not adapted to the stage. His most valuable work, *Münchhausen*, 4 vols., passed through several editions.

IMMIGRATION (EMIGRATION, *ante*) to the United States far exceeds that to any other country in the world. The steadily increasing current of human beings flowing

hither from the ends of the earth attracts universal attention and demands serious deliberation. There are traditions of the simultaneous migration of entire nations in the early ages, but never since the dispersion at Babel has there been anything of such general and cosmopolitan nature as that which forms one of the great phenomena of the age—American immigration. Before the revolution there were few immigrants. The earliest were the gold-seekers from Spain, but they had no intention of remaining in the country. The moving causes of immigration to Canada and New England were religious and political troubles. The Puritans came for religious freedom. The revocation of the edict of Nantes drove a great number of Huguenots across the sea. Yet before the Revolution the extent of immigration was not significant. The establishment of a free republic brought a change, and Europe began to send forth her thousands; but they were as nothing when compared with the myriads of modern times. Up to 1820 no official records of immigration were kept. It was reckoned that from 1784 to 1794 the arrivals were not more than 4,000 per year. In 1794, owing to war between England and France, the arrivals reached about 10,000; but this was an exceptional year, and the number of arrivals was not again so large until 1807. Dr. Seybert, in his *Statistical Annals of the United States*, says the average of immigration from 1790 to 1810 was about 6,000 a year. During the decade 1806-16 immigration was almost suspended in consequence of war with England and serious political complications with France. England's doctrine—relinquished only after a war—"Once a subject, always a subject," was sufficient to deter most people from attempting to leave that country while the war was going on. The blockading of the French ports under the British orders in Council, Jan., 1807, and Napoleon's prompt retaliation in the Berlin decree of the same year, which interdicted commerce with Great Britain, followed by the Milan decree against all continental intercourse with the British, were other powerful influences to check and indeed practically destroy European emigration. The French decrees were annulled in 1811, just before the war between the United States and Great Britain, and American ships were released by France only to fall into the clutches of British cruisers. During the three years of war immigration was suspended, the arrivals being so few as to be hardly worth noticing. It was not until 1817 that the current of immigration, checked ten years before, began to flow freely, and in that year the arrivals, including American citizens coming home, were 22,240, nearly three times as many as in the preceding year. Great suffering occurred in ships crowded with immigrants, and the attention of congress was drawn to the subject. In the spring of 1818 a bill was proposed to remedy the evils; it was passed in Dec., and approved Mar. 2, 1819. In compliance with this act collectors of customs have ever since reported to the treasury department the number of passengers from other countries arriving in their several districts, with the sex, ages, and occupations of such passengers, and the countries in which they were born.

The following table gives the aggregates of immigration at all ports, from the organization of the government to Jan., 1880:

NUMBER OF ALIEN PASSENGERS ARRIVED IN THE UNITED STATES FROM FOREIGN COUNTRIES, FROM OCT. 1, 1819, TO JUNE 10, 1880.

PERIOD.	Alien Passengrs Arrived.	Immigrants arrived.	Excess of Immigr'nts over emigrants.	PERIOD.	Alien Passengrs Arrived.	Immigrants arrived.	Excess of Immigr'nts over emigrants.
1820	8,385	.....	.....	1850 (to Dec. 31).	59,976	.....	.....
1821	9,127	.....	.....	1851 (to Dec. 31).	379,466	.....	.....
1822	6,911	.....	.....	1852	371,603	.....	.....
1823	6,354	.....	.....	1853	368,645	.....	.....
1824	7,912	.....	.....	1854	427,833	.....	.....
1825	10,199	.....	.....	1855	200,877	.....	.....
1826	10,837	.....	.....	1856	200,036	195,857	.....
1827	18,875	.....	.....	1857	250,882	246,945	.....
1828	27,382	.....	.....	1858	122,872	119,501	.....
1829	22,520	.....	.....	1859	121,075	118,616	.....
1830 (to Sept. 30)	23,322	.....	.....	1860	153,418	150,237	.....
1831	22,633	.....	.....	1861	91,822	89,724	.....
1832	58,179	.....	.....	1862	91,826	89,007	.....
1832 (to Dec. 31).	7,303	.....	.....	1863	176,214	174,524	.....
1833 (to Dec. 31).	58,640	.....	.....	1864	193,416	193,195	.....
1834	65,365	.....	.....	1865	248,111	247,453	.....
1835	45,374	.....	.....	1866 (to June 30)	167,757	166,112	.....
1836	76,242	.....	.....	1867 (to June 30)	303,044	298,967	273,463
1837	79,340	.....	.....	1868	288,088	282,189	260,813
1838	38,914	.....	.....	1869	363,074	352,768	316,029
1839	68,069	.....	.....	1870	402,920	387,203	354,899
1840	84,066	.....	.....	1871	342,609	321,350	293,724
1841	80,289	.....	.....	1872	422,978	404,806	379,130
1842	104,565	.....	.....	1873	473,141	459,803	401,731
1843 (to Sept. 30)	52,496	.....	.....	1874	327,949	313,339	240,993
1844 (to Sept. 30)	78,615	.....	.....	1875	244,632	227,498	134,744
1845	114,371	.....	.....	1876	189,991	169,986	106,373
1846	154,416	.....	.....	1877	165,019	141,857	69,954
1847	234,968	.....	.....	1878	157,776	138,469	73,914
1848	226,527	.....	.....	1879	197,954	177,826	135,825
1849	297,024	.....	.....	1880	484,196	457,257	.....
1850	310,004	.....	.....				

Statistics of the sex and ages of immigrants are not complete, but, as the proportions do not vary in any perceptible degree from time to time, the figures of a single year will represent the average. They are:

Male adults	146,223	49.63 per cent of all immigration.
Female adults	86,089	29.23 per cent.
Children under twelve years	60,532	20.55 per cent.
Unascertained	1,637	.59 per cent.
Total	294,581	100.00 per cent.

The following table denotes the sexes and ages of immigrants from 1820 to 1860, inclusive:

Ages.	Males.	Females.	Total.	Per Cent. Male.	Per Cent. Female.
Under 5	218,417	200,676	419,093	4.14	3.81
5—10	199,704	180,606	380,310	3.79	3.42
10—15	194,580	166,833	361,413	3.69	3.16
15—20	404,398	349,755	754,093	7.67	6.63
20 and under	1,017,069	897,890	1,914,909	19.29	17.02
20—25	669,853	428,974	1,098,827	12.71	8.13
25—30	576,822	269,554	846,376	10.94	5.11
30—35	352,619	163,778	516,397	6.69	3.12
35—40	229,468	114,165	353,633	4.54	2.16
40 and over	342,022	200,322	542,344	6.49	3.80
20 and over	2,180,774	1,176,793	3,357,577	41.37	22.32
Total	3,197,823	2,074,663	5,272,486	60.66	39.34

It is worthy of note that of all immigrants 64 in every 100 are in the reproductive age. This accounts for the often-noticed fact that foreigners are, or appear to be, more prolific than natives. An examination of the census shows that nearly 45 per cent of male immigrants are between the ages of 20 and 40; while of male natives, 14½ per cent are within that period. There is, in fact, but slight difference in the proportion of children to mothers between natives and foreigners. In the New York census of 1865 it was shown that the average number of children to native mothers was 341 in 100, while for foreign mothers it was 360 per 100.

The nationality of immigrants has, of late years, been very carefully recorded, especially at New York, where nearly 77 per cent of the strangers are landed. The following table will show where the greater portion of the vast multitude came from:

Ireland	3,065,761
England	894,444
Scotland	159,547
Wales	17,893
Other British	560,237
Total from British islands	4,697,912
Germany	3,081,813
Sweden	177,664
Norway	128,428
Denmark	48,630
Holland	44,319
Belgium	23,267
Mainly Teutonic	3,504,110
France	313,700
Switzerland	83,709
Italy	69,559
Spain	28,091
Portugal	9,062
Latin races	504,121
Russia	38,028
Poland	14,231
Hungary	6,085
	58,344

Hungarians are often counted as Austrians. Some thousands and hundreds from other European nations make up the greater part of the remainder.

The Chinese arrivals up to 1877 numbered 207,270; but probably not more than 100,000 have ever been in the country at one time. The whole number of countries and islands from which immigrants have been received is nearly seventy. A general summary for nine years is here given:

From Europe.....	264,548	351,265	396,380	261,232	181,635	120,103	105,092	100,832	133,070	1,914,157
From Asia.....	7,236	7,825	20,326	13,857	16,498	22,943	10,640	9,014	9,660	117,999
From Africa.....	43	62	39	22	54	54	22	14	17	327
From America	48,840	42,205	40,337	35,339	26,642	24,686	24,065	27,204	33,025	302,343
From Pacific Isl'ds.	25	2,416	1,413	1,170	1,269	1,312	914	606	816	9,941
From all others, not specified	658	1,033	1,308	1,719	1,400	888	1,124	799	1,238	10,167
Aggregate.....	321,350	404,806	459,803	313,339	227,498	169,986	141,857	138,469	177,826	2,354,934

As New York is the main port of debarkation for immigrants, that state in 1847 established a board of commissioners of immigration, through whose care nearly 8,000,000 immigrants have passed. A strong effort has been made in congress to take the control of immigration into the care of the general government, but thus far without success.

The destination of immigrants has been inquired for by the New York commissioners since 1854, with the following results:

Eastern States.	Number.
Maine	6,437
New Hampshire	4,326
Vermont	6,454
Massachusetts	179,233
Rhode Island	36,224
Connecticut	71,132
Total Eastern States	303,806

Nearly all who go east are employed in manufactories.

Middle States.	Number.
New York	1,572,542
New Jersey	123,361
Pennsylvania	402,491
Maryland	28,286
Delaware	3,514
Total Middle States	2,130,194

The great number under "New York" includes many of those who have not determined upon a place for final settlement.

Middle Western States.	Number.
Ohio	201,016
Michigan	109,290
Indiana	48,822
Illinois	365,926
Wisconsin	191,656
Total Middle Western	916,710

West of the Mississippi.	Number.
Minnesota	73,369
Iowa	85,369
Missouri	71,297
Kansas	23,572
Nebraska	22,459
Colorado	3,250
Total	279,316

Pacific States and Territories.	Number.
California	54,987
Oregon	945
Nevada	2,308
Territories	48,201
Total	106,441

Of the total for territories, Utah took 40,317—all Mormons.

Southern States.	Number.
Virginia	10,691
District of Columbia	11,597
West Virginia	1,806
North Carolina	1,058
South Carolina	2,806
Georgia	3,212
Florida	814
Alabama	1,016
Louisiana	6,888
Texas	5,415
Arkansas	922
Mississippi	1,362
Tennessee	6,746
Kentucky	17,112
Total	71,445

This makes a total of 3,807,715. The remainder went: 74,353 to the British provinces, 2,358 to Mexico, South America and elsewhere, and 22,759 gave no destination; the grand total of whom inquiries were made was 3,906,985. Of those settling in the United States, 5.35 per cent went to New England; 55.59 per cent to the Middle states; 24.07 per cent to the middle Western states; 7.33 per cent to west Mississippi states; 2.79 per cent to Pacific states and territories; and 4.87 per cent to the Southern states. The latter section of the union does not appear to be any more attractive to immigrants than it was in the days of slavery.

Many calculations have been made as to the amount of money brought into the country by immigrants, and the lowest places it at $50 per head. This would make near $500,000,000 for the whole. But there is far more value in the labor and enterprise which they bring.

The main causes of advance or decline in immigration are usually war, famine, or financial depression. The *coup d'etat* of Dec., 1851, within the three following years sent half a million persons to the United States. The Franco-German war had a similar effect, to a large extent. The Irish famines drove a million of the people of that island to this country. On the other hand, a financial crisis or a war in the United States at once checks immigration, as was seen after the panics or hard times of 1837, '57, '73, and '77. The rebellion naturally kept foreigners away, and the arrivals dropped from 153,640 in 1860 to 91,823 in 1861. The return of prosperity in 1879 started the tide again, and the year 1880 shows a total of nearly half a million of immigrants.

IMMORALITY, in point of law, is a good defense to actions and suits, but it must be some immorality which runs counter to the well-known policy of the law. Thus, for example, if a man gave a bond, or granted a deed, giving to a woman some annuity, with a view to induce her to live in concubinage, this would be a good defense against the bond or deed being enforced, for the law discountenances his conduct; whereas, if it were merely a bond, or a gift, in consideration of something of the same kind past and ended, the deed would be good. So the keeper of a house of ill-fame is not allowed to sue, and has no legal remedy against her guests for any sum agreed to be paid for immoral purposes. In most other respects the mere personal immorality of the parties who are litigants makes no difference whatever as to their respective remedies, for the law protects the bad as well as the good, the unjust as well as the just.

IMMORTALITY is the continued existence of the human soul in a future and invisible state. "If a man die, shall he live again?" is a question which has naturally agitated the heart and stimulated the intellectual curiosity of man, wherever he has risen above a state of barbarism, and commenced to exercise his intellect at all. The religion of all civilized peoples may be said more or less to recognize the affirmative of the question,* although often under very vague and materialistic forms. In the ancient Egyptian religion the idea of immortality first assumes a definite shape. There is a clear recognition of a dwelling-place of the dead and of a future judgment. Osiris, the beneficent god, judges the dead, and "having weighed their heart in the scales of justice, he sends the wicked to regions of darkness, while the just are sent to dwell with the god of light." The latter, we read on an inscription, "found favor before the great God; they dwell in glory, where they live a heavenly life; the bodies they have quitted will forever repose in their tombs, whilst they rejoice in the life of the supreme God." Immortality is plainly taught, but bound up with the idea of the preservation of the body, to which the Egyptians attached great importance, as a condition of the soul's

* Some of the most widely spread forms of belief in the world would seem to be exceptions to this statement: for in Hinduism the goal sought is absorption into the universal spirit, and therefore loss of individual existence; while the pious Buddhist strives for *Nirvana* or complete extinction. Yet even here the belief in a future life exists in the form of the transmigration of souls (q.v.).

continued life; and hence they built vast tombs, and embalmed their bodies, as if to last forever. In the Zoroastrian religion the future world, with its governing spirits, plays a prominent part. Under Ormuz and Ahriman there are ranged regular hierarchies of spirits engaged in a perpetual conflict; and the soul passes into the kingdom of light or of darkness, over which these spirits respectively preside, according as it has lived on the earth well or ill. Whoever has lived in purity, and has not suffered the *dêvs* (evil spirits) to have any power over him, passes after death into the realms of light. In the early Grecian paganism hades, or the realms of the dead, is the emblem of gloom to the Hellenic imagination. "Achilles, the ideal hero, declares that he would rather till the ground than live in pale elysium." This melancholy view of the future everywhere pervades the Homeric religion. With the progress of Hellenic thought a higher idea of the future is found to characterize both the poetry and philosophy of Greece, till, in the Platonic Socrates, the conception of immortality shines forth with a clearness and precision truly impressive. In the *Apology* and the *Phædo* Socrates discourses of the doctrine of the soul's immortality, in language at once rich in faith and in beauty. "The soul, the immaterial part, being of a nature so superior to the body, can it," he asks in the *Phædo*, "as soon as it is separated from the body, be dispersed into nothing, and perish? Oh, far otherwise. Rather will this be the result. If it take its departure in a state of purity, not carrying with it any clinging impurities of the body, impurities which during life it never willingly shared in, but always avoided, gathering itself into itself, and making the separation from the body its aim and study—that is, devoting itself to true philosophy, and studying how to die calmly; for this is true philosophy, is it not?—well, then, so prepared, the soul departs into that invisible region which is of its own nature, the region of the divine, the immortal, the wise, and then its lot is to be happy in a state in which it is freed from fears and wild desires, and the other evils of humanity, and spends the rest of its existence with the gods."

It is only in Christianity, however, that this higher life is clearly revealed as a reward not merely to the true philosopher, but to every humble and pious soul. Christ "hath brought life and immortality to light by the gospel." "According to his abundant mercy, God hath begotten us again unto a lively hope by the resurrection of Jesus Christ from the dead, to an inheritance incorruptible and undefiled, and that fadeth not away, reserved in heaven." It is undoubtedly owing to Christianity that the doctrine of the soul's immortality has become a common and well-recognized truth—no mere result of speculation, nor product of priestly invention—but a light to the reason, and a guide to the conscience and conduct. The aspirations of philosophy, and the conceptions of mythology, are found in the gospel transmuted into an authoritative influence, governing and directing the present life.

IMMORTALITY, *ante*. I. *Arguments for the fact.* 1. As matter does not cease to exist when it changes its form, so man's spiritual substance at least will not be annihilated when it changes its state: this argument, though not proving personal immortality, prepares the way for its proof. 2. The spirit, as in its nature, distinct from matter, will—we must suppose in lack of proof to the contrary—continue its existence; there is no proof that man's spirit dies; all that is known to die is his body; we must therefore believe his spiritual life to continue. 3. The mental powers, being capable of a development which cannot be reached in this life, must find in the future that unlimited sphere of exertion for which they have wisely been adapted. 4. The wisdom of God will complete what it has begun; his goodness will satisfy the longings of man's spiritual nature; his justice will bring to an end the present disorders of the moral world. 5. Our moral nature prompts the expectation that virtue and right will be rewarded, and vice and wrong punished or repressed in another world, as they are not fully in this. 6. In the history of mankind there has been a general belief in future rewards and punishments. In the Veda of the Hindus, Müller says: "The immortality of the soul, as well as personal responsibility after death, is clearly proclaimed." This statement prof. Roth confirms, saying: "We find in the Veda, not without astonishment, beautiful conceptions on immortality expressed in unadorned language with child-like conviction." The Chinese show their belief in immortality by worshiping their ancestors. When a man dies, they say he has returned to his family. Confucius taught that the spirits of the good are allowed to revisit their earthly habitations to receive homage and to bestow blessing. The Egyptians believed in a dwelling-place of the dead and a future judgment. "Osiris judges the dead, and having weighed their heart in the scales of justice, sends the wicked into darkness and the just to the god of light." According to Persian belief, man passed to a future of reward or penalty. Some tribes of South American Indians believe that there are two great powers of good and evil and a number of inferior deities who have been the creators of different families; and that when an Indian dies his soul goes to live with the deity who controls his particular family. Another American tribe "expect, when they die, to return to the original seat of their forefathers; the good reaching it by means of the intervening lake, which the wicked, burdened with their sins, cannot cross." The Choctaws are said to "hold that the spirit lives after death and must travel a great distance towards the west, and across a dreadful, deep, and rapid stream upon a long and slippery log. The good pass it safely, but the wicked slip and fall." The native tribes of Australia believe that all good men,

who are properly buried, at their death enter heaven, which, they say, is "a delightful place, the abode of two good divinities with an abundance of food, a pleasant climate, freedom from evil spirits, and pleasures suited to their tastes. They believe also in an evil spirit, who dwells in the nethermost regions." "The Greenlander believes that at death the soul travels to a land of perpetual summer, all sunshine and no night. But the journey is difficult and attended with many perils, in some of which the soul, suffering another death may perish utterly, to exist no more." Several nations in Java and America have, it is said, the idea of a perilous bridge which has to be crossed at death; while in Polynesia some think the soul, instead of crossing a bridge, must pass over a great gulf in a canoe. Among the more cultivated ancient nations nobler ideas of immortality were sometimes cherished. Homer represents Achilles as convinced of the existence of souls after death by the appearance to him of the dead Patroclus in a dream. Plato describes Socrates as arguing and declaring the sure immortality of the spirits of good men, and, it would seem, of all men—though only the pure could be happy. The Old Testament Scriptures undeniably refer to the fact of a future life, though they give only an incomplete revelation concerning it. Of Enoch they say, "He was not, for God took him." Abraham, they say, "died and was gathered to his fathers," referring, not to his burial, for he was not buried near their graves, but to his entrance into the future state. So Jacob was gathered to his people when he died, though his burial was delayed many days. So Aaron was gathered to his people, though he was buried on Mount Hor; and Moses also, though no man knew of his sepulcher. Abraham, with other Old Testament believers, desired a heavenly country and "looked for the city which hath the foundations." David said, "I shall be satisfied when I awake with thy likeness." 7. Christ and the New Testament bring life and immortality to light, certifying what had been doubtful and dim. Christ stands as the supreme and final witness to the fact.

II. *Its nature and extent.* Of its nature we know little, since reason has not the materials for a science of immortality, and revelation is silent except as concerns the moral and practical bearings of the great fact which it affirms with intense energy. What is known through reason or revelation on this theme may be summed up as follows: 1. There is a life for man after the death of the flesh, which life is spiritual, in a spiritual body, amid spiritual surroundings. 2. This life is in the completed likeness of the life of Christ, who is the Son of God and the Head of humanity; therefore a life of blessing, beauty, and glory, of wisdom, power, and holy love—imperishable, incorruptible, eternal: to it pertain consciousness, identity, and a complete moral and spiritual personality. 3. This immortality is naturally possible to every individual person of the human race; being provided and secured in the very creation of the human race in and through the Son of God as the archetype of humanity, so that through him all men are constituted by their nature sons of God. 4. This immortality, naturally possible, becomes actual in the case of every human person who does not through willful love of evil refuse the eternal life of purity, holiness, and love: thence it becomes actual through Christ in the case of any heathen who sincerely and faithfully seek after God and goodness in the use of such light as they have: thence also it may be considered as applying to infants devoid of willful and personal wickedness. 5. This life, naturally possible to all men, does never become actual in the case of any who willfully refuse the light, and so reject the life. 6. These are not presented in the Bible as having immortality, or as entering into the eternal life, since immortality means deathlessness, and they are presented as under the power of death; yet to assert that they have no continued or future existence of any kind is to assert what no man knows or can prove: on the contrary, their future existence, certainly for a time, is indicated; and its everlasting continuance cannot, to say the least, be disproved. Thus, in fine, immortality, or the eternal life of a human spirit joined to the life of God, our thought can take firm hold upon; it is positive, radiant, unquestionable; while as to the eternal death, it is an "outer darkness" with no firm foothold for our thought as to its nature or its scenes. Upon these points, therefore, it is wise to restrict dogmatic assertion. See ESCHATOLOGY.

IMMORTELLES. See EVERLASTING FLOWER.

I'MOLA (anc. Forum Cornelii, or Forum Syllæ), a t. of Italy, in the province of Bologna, stands in a fruitful plain adjoining picturesque hills, close to the river Santerno, and 24 m. w.s.w. of Ravenna. It contains some fine palaces, churches, theaters, and benevolent institutions. Imola possesses some good manufactures of wax, oil, majolica, silk, and glass, besides extensive leather-curing establishments, and brick and tile works. From a species of white grape grown in the vicinity the delicious wine known as *vin santo* is manufactured. Pop. '72, 18,398.

IMOS'CHI, a t. of the Austrian empire, in Dalmatia, in n. lat. 43° 30', e. long. 17° 15'. It has markets twice a week, which are much frequented by Turks. Pop. (probably including a district), 22,000.

IMPALE, in heraldry, to arrange two coats of arms side by side in one shield divided per pale. It is usual thus to exhibit the conjoined coats of husband and wife, the husband's arms occupying the dexter side or place of honor, and the wife's the sinister

side of the escutcheon. When a man marries a second wife, heralds say that he may divide the sinister half of the shield per fess into two compartments, placing the family arms of his deceased wife in chief, and of his second wife in base. A husband impaling his wife's coat with his own is not allowed to surround the former with the collar or insignia of any order of knighthood to which he may belong. Bishops, deans, heads of colleges, and kings-of-arms, impale their arms with their insignia of office, giving the dexter side to the former. In early heraldry, when two coats were represented in one shield side by side, only half of each was exhibited, an arrangement which has been called *dimidiation*. Sometimes the one coat only was dimidiated. A reminiscence of dimidiation is preserved in the practice of omitting bordures, orles, and tressures in impaled arms on the side bounded by the line of impalement.

IMPANATION (Lat. *in*, and *panis*, bread), a technical word employed in the eucharistic controversies to express the peculiar opinion propounded by Luther as to the nature of the presence of Christ in the eucharist. Differing from the Roman Catholics in denying the transubstantiation of the bread and wine, and from the sacramentarians in denying that our Lord's presence was merely typical or figurative, Luther contended that the body and blood of Christ were present in, or along with, the elements of bread and wine; in a manner analogous to that in which the divinity of Christ co-exists in the same person with his human nature. Hence, by an analogy with the word incarnation, he devised for the eucharistic union the term impanation. This doctrine was the subject of a lengthened controversy with Zwingli at Marburg in 1529, which left each party unconvinced; and this theory still continues to be the received one in the orthodox Lutheran schools.

IMPEACHMENT, the name given to an accusation and trial of a peer or member of parliament, or, indeed, any other person, before the high court of parliament, for treason, or some high crime or misdemeanor. This is a kind of trial which is reserved for great and enormous offenders, particularly in matters affecting the constitution, for the ordinary tribunals generally suffice for all cases of crimes. Impeachment, accordingly, is of rare occurrence, the last instance being that of lord Melville in 1805; but as it is one of the high prerogatives of parliament to try offenders in this way, it is still competent to use it. The proceedings nearly resemble an ordinary trial at law. A pardon by the crown is not pleadable in bar of the prosecution, though, after sentence, the crown may pardon the offender. See May, *On Parliaments*.

IMPEACHMENT (*ante*). By the constitution of the United States, art. 1, sec. 4, the president, vice-president, and all civil officers of the nation, are made liable to removal from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors. The house of representatives has the sole power to initiate proceedings in cases of impeachment. When that body has impeached an officer it becomes the sole duty of the senate to try the case as thus presented, and when sitting for that purpose the members must be on oath or affirmation. When the president of the United States is tried the chief-justice must preside, and no person can be convicted without the concurrence of two-thirds of the members present. Judgment in cases of impeachment extends no further than removal from office, and disqualification to hold and enjoy any office of honor, trust, or profit, under the United States; but the party convicted is liable and subject to indictment, trial, judgment, and punishment, according to law. The chief trials for impeachment have been those of judge Chase in 1804, judge Peck in 1831, judge Humphreys in 1862, and president Johnson in 1868. Proceedings on impeachment under the state constitutions are somewhat similar. A witness giving testimony in a court of law is said to be impeached when he is proved to be unworthy of credit.

IMPEACHMENT OF WASTE, an expression in English law, used in deeds or wills. When an estate is given to a person for life, or for a term of years, *without impeachment of waste*, the tenant is entitled to cut timber, and do many things on the estate which otherwise he would be unable to do. Still, he is not allowed to do what he likes, for if he abuses his power, and attempts to cut down ornamental timber, for example, or deface the family mansion, the court of chancery will interfere by injunction to prevent this. The phrase is not used in Scotland, but the law is not materially different.

IMPENNATES, a name which has been applied to a tribe of swimming birds with very short and small wings, upon which there are only rudimentary feathers or scaly skin. The penguin and the great auk are examples. These birds are usually embraced in the family *brevipennatæ*, which includes penguins, auks, guillemots, divers or loons, and grebes. They belong to the order *natatores*. See PENGUIN, AUK, DIVER, GREBE and GUILLEMOT, *ante*.

IMPENETRABILITY, one of the essential properties of matter, implies that no two bodies can at the same time occupy the same space. If a nail be driven into a piece of wood it does not, properly speaking, *penetrate* the wood, for the fibers are driven aside before the nail can enter. If a vessel be filled with fluid, and a solid body be then placed in it, as much water will run over as is equal in bulk to the solid body, in

this way making room for it. The lightest gases are really as impenetrable as the densest solid; although, owing to their compressibility, it is not readily made apparent.

IMPERATIVE, CATEGORICAL. According to Kant (q.v.), man, in the consciousness of his moral liberty, recognizes two great laws regulating his will; the first prompts him to seek his own well-being, the second *commands* him to be virtuous, even at the sacrifice of that. From this opposition in his moral nature between desire and conscience, springs up the idea of duty, which, in the Kantian terminology, is called the "moral imperative," to which Kant adds the epithet *categorical*, to indicate that its commands are absolute and unconditional.

IMPERA'TOR. See EMPEROR, *ante*.

IMPERIAL CROWN properly signifies the crown borne by the German emperor; in form, a circle of gold, adorned with precious stones and *fleurs-de-lis*, bordered and seeded with pearls, and raised in the form of a cap voided at the top like a crescent. From the middle of the cap rises an arched fillet enriched with pearls, and surmounted by a globe, on which is a cross of pearls. The name imperial crown is, however, in English heraldry, applied to the crown worn in times past by the kings of England. From the 12th c. onwards the crown of the English sovereigns underwent repeated changes in form and enrichment. That of Edward II. was formed of four large and four small strawberry leaves, rising in curves from the jeweled circlet, and having eight small flowers alternating with the leaves. In Henry IV.'s crown eight strawberry leaves, and as many *fleurs-de-lis* alternated with 16 small groups of pearls, three in each. Under Henry V. the enriched circlet was for the first time arched over with jeweled bands of gold, and the apex of the arches surmounted with a mound and cross, while *crosses patées* were substituted for the strawberry leaves, and roses or *fleurs-de-lis* for the clusters of pearls. The arches, at first numerous and elevated to a point, became, in later times, restricted to four, and depressed in the center. The imperial crown of heraldry, as now understood, is, in point of fact, the form of crown worn by the English sovereigns from Charles II. to William IV. It has four *crosses patées* and four *fleurs-de-lis* set alternately on the circlet, while four pearl-studded arches, rising from within the crosses, carry at their intersection the mound and cross. The state crown of queen Victoria differs considerably from this, having a far more enriched character. It is covered with diamonds and studded with gems, and the arches are wrought into wreaths of rose, thistle, and shamrock formed of brilliants. A charge, crest, or supporter, crowned with a regal crown, is said to be *imperially crowned*.

IMPE'RIUM is a word used in the Roman law in various senses, the most important of which is that which it bears when applied to consuls and proconsuls—thence called imperators. Most of the superior magistrates were also intrusted with the imperium, which meant a sovereign authority. It is of very little practical importance in modern times to trace the extent or precise nature of the authority thus designated, as the subject has no bearing on modern law.

IMPERTINENCE, in English law, means some irrelevant matter introduced in an affidavit or pleading; and the court will generally order it to be struck out, and the offending party to pay the costs of doing so.

IMPETI'GO, a disease of the skin. It consists of crops of pustules, which may either be scattered or collected in groups. These pustules burst, dry up, and become covered with scabs or crusts of a yellow color, not unlike little masses of candied honey. From beneath these crusts, a purulent discharge commonly takes place; the crusts become thicker and larger, and the skin around and beneath them is red and raw. The disease may be either acute or chronic. In the former case, it is attended with febrile symptoms, which must be combated by the internal administration of purgatives and alkalies, strict attention to diet, and weak alkaline lotions. In chronic cases the discharge may be checked by a lotion containing 10 or 15 grains of oxide of zinc in an ounce of rose-water.

There are various forms of this complaint, as *I. figurata*, *I. sparsa*, etc. The disease known as *crustea lactea*, which sometimes covers the faces of children like a mask, is a sort of compound of impetigo and eczema; and the rose-water lotion already mentioned is a useful application for it.

IMPEYAN, or IMPEYAN PHEASANT, *Lophophorus Impeyanus*, a large gallinaceous bird of the family *phasianidæ*, a native of high cold regions of the Himalayas, but remarkable as much as any tropical bird for the splendor of its plumage, enhanced by the changing metallic tints which it exhibits—green, steel-blue, violet, and golden bronze. The fine plumage, however, belongs to the male alone. The female is clothed in sober brown, mottled with gray and yellow, and is smaller than the male. The impeyan has been found capable of domestication, and may probably be found capable of naturalization, in Britain. It derives its name from lady Impey, who first attempted to bring it alive to Britain, but failed. The Nepaulese name, *monaul*, signifies *bird of gold*.

IMPLEMENT, in Scotch law, means fulfillment of a contract or decree of the court.

IMPLEMENTS, AGRICULTURAL. Under this term are generally comprehended not only the implements used in the actual cultivation of the soil, but those requisite for other operations of farming, and for the preparation of the produce of the land for use, in so far as it is ordinarily carried on by the farmer. The first implements for the cultivation of the ground were doubtless such as could be used by man's unaided strength, and many such are still in use, as the spade, the hoe, the fork, and the shovel. When animals were reduced to the service of man the plow appeared in its first rude form. Grubbers, cultivators, etc., are recent inventions; rollers are more ancient. Sowing machines or drills are modern, but the harrow is ancient, although branches of trees drawn along the newly sown land, long served the purpose of its now carefully adjusted tines.—The necessity of irrigation in some countries early led to expedients and implements for accomplishing it. Implements for clearing the ground of weeds, for occasional stirring of the ground whilst under crop, and for *earthing up* crops, are all, except the hoe, of comparatively recent invention. The scythe and sickle have existed from remote antiquity, although the reaping-machine is a novelty only beginning to assume a very important place. Wheel-carriages of various descriptions and for various purposes must be mentioned among agricultural implements; also implements for thrashing and winnowing corn, for scutching and breaking flax, for ginning cotton, for crushing sugar-cane and evaporating its juice, etc. The preparation of the produce of different plants requires implements of different kinds. Others are required in the care of cattle, and for the dairy (q.v.). The principal agricultural implements are noticed in separate articles, and some in connection with particular kinds of cultivated plants.

IMPLU'VIUM, a tank or cistern in the center of the hall or atrium (q.v.) of a Roman house. In the examples which remain at Pompeii the impluvium is generally formed of marble. It is placed immediately under the unroofed part of the atrium, and is intended to receive the rain which runs down from the roof through the opening. The impluvium was frequently adorned with fountains, and formed a very peculiar and interesting feature in the dwellings of the Romans.

IMPONDERABLE SUBSTANCES, an epithet applied to light, heat, electricity, and magnetism, at a time when they were universally considered as matter, in contradistinction to those substances which possessed sensible weight. See HEAT.

IMPOON, *Antilope* or *Cephalopus mergens,* a small species of antelope, very plentiful in South Africa, in wooded districts. It is about 21 in. high at the shoulder, of a brownish-yellow color, with white belly. The horns are short and conical, set far back, and inclined backwards. It lives solitary or in pairs. From its habit of plunging amongst bushes when pursued, standing on its hind legs at intervals to observe its pursuers, and disappearing again, the impoon is called *duyker-bok* (diver-buck) by the Dutch colonists of South Africa, among whom its flesh is in great esteem.

IMPORTS AND EXPORTS. See BALANCE OF TRADE.

IMPORTS AND EXPORTS (*ante*), or Foreign Trade of the United States. In 1840, when ocean steam navigation began to be successful, the entire importations of merchandise into the United States was valued at only $86,250,335. The largest value of merchandise in any one year's importation was in 1873, the total being $642,136,210. The offset of exports for the years named was $111,660,561 in 1840, and $505,033,439 in 1873. From 1863 to 1873 the value of imports of merchandise largely exceeded the values of exports, the excess of imports ranging from $39,371,368 in 1863 to $182,417,491 in 1873. During the years ending June 30, 1876, '77, '78, and '79, however, the value of exports of domestic merchandise from the United States has greatly exceeded the value of imports, the excess of exports increasing rapidly from year to year. The countries from which imports come are, in the order of value for 1879: Great Britain, $108,538,812; Cuba, $63,649,656; France, $50,684,601; Brazil, $39,375,441; Germany, $35,519,818; British America, $26,133,554; China, $18,084,694; British East Indies, $12,225,770; Japan, $9,845,562; Italy, $7,884,327; Colombia, $6,330,946; Spanish possessions, $5,523,067; Mexico, $5,493,221; Dutch East Indies, $5,435,331; Venezuela, $4,855,034; Porto Rico, $4,384,954; Belgium, $4,209,232; British West Indies and Honduras, $3,719,085; Netherlands, $3,680,932; Argentine Republic, $3,518,105; Spain, $3,334,241; Hawaiian islands, $3,257,938; Hayti, $2,790,476; French West Indies and Guiana, $2,634,090; Central America, $2,251,589; Peru, $1,857,859; Uruguay, $1,780,140; all other countries, $8,770,303; total imports in 1879, $445,777,775. The principal articles of importation, and their value in specie, for the years ending June 30, 1878 and 1879, are given in the annexed table:

Commodities Imported.	1878.	1879.
Sugar	$71,924,267	$70,642,869
Molasses, melada, and cane syrup	7,902,181	8,645,197
Coffee	51,917,609	47,256,819
Silk, raw	5,103,084	8,371,025
" manufactures of	19,837,972	24,013,398
Wool, raw	8,363,015	5,034,555
" manufactures of	25,230,154	24,353,821
Chemicals, drugs, dyes, and medicines	24,738,469	27,038,808
Cotton, raw	469,882	499,931
" manufactures of	19,081,037	19,928,310
Hides and skins, except furs	17,223,363	15,959,017
Flax, raw	1,177,229	969,451
" manufactures of	14,413,600	14,693,842
Tea	15,660,168	14,577,618
Tin, and manufactures of	12,171,030	12,513,864
Breadstuffs and farinaceous food	8,800,499	10,614,173
Fruit and nuts, of all kinds	9,738,546	10,316,579
Iron and steel, and manufactures of	9,057,622	9,447,148
Leather, and manufactures of	7,469,359	7,556,854
Wood, and manufactures of	5,736,756	6,257,746
India-rubber and gutta-percha, and manufactures of	4,953,666	6,242,225
Wines, spirits, and cordials	5,517,427	6,037,033
Tobacco, and manufactures of	6,439,868	5,888,876
Jute, grasses, and manufactures of	4,104,588	5,557,897
Provisions, including eggs and fish	4,776,747	4,575,152
Furs, dressed and undressed	3,944,270	4,516,290
Fancy goods	4,200,737	4,119,217
Earthen, stone, and China ware	4,051,786	4,052,787
Precious stones	3,039,102	3,842,007
Glass and glass-ware	3,345,149	3,222,479
Buttons and button materials	3,362,085	3,197,070
Paper rags and material	3,993,669	3,196,243
Animals, living	2,664,676	2,794,129
Straw and palm leaf, manufactures of	2,296,266	2,508,679
Seeds	2,522,202	2,213,857
Books, engravings, and other publications	1,870,580	2,057,125
Hemp, raw and manufactured	2,443,953	1,936,069
Spices	1,936,217	1,824,171
Salt	1,632,825	1,776,741
Coal, bituminous	1,936,187	1,724,466
Metals, and manufactures of, not specified	2,068,570	1,582,884
Dyewoods in sticks	1,396,485	1,406,179
Paintings, photographs, and statuary	968,517	1,269,039
Paper, and manufactures of	1,466,625	1,186,382
Clothing, except of silk or hosiery	1,275,419	1,171,296
Hair of all kinds, and manufactures of	727,365	942,931
Watches and watch materials	812,582	920,599
Paints of all kinds	848,113	759,580
Marble and stone, manufactures of	746,956	689,288
Beer, ale, and porter	592,707	628,806
Musical instruments	561,867	627,722
All other merchandise	18,565,173	22,376,149
Total imports of merchandise	$437,051,532	$445,777,775
Total imports of coin and bullion	29,881,314	30,296,000

For the fiscal year ending June 30, 1880, the total imports of merchandise were $667,954,746. Total imports of coin and bullion, $93,034,310.

In the following table is given the value of the principal commodities of foreign production in which there has been a considerable decrease of importation since 1873, the year of the highest total importation:

Commodities.	1873.	1874.	1875.	1876.	1877.	1878.	1879.
	$	$	$	$	$	$	$
Clothing, including hosiery, etc. of cotton and wool	8,496,993	7,069,996	7,370,626	7,004,162	5,574,412	6,540,587	6,560,456
Cotton, manufactures of, without hosiery, etc.	29,752,116	23,572,610	22,790,377	18,042,727	15,119,094	14,398,791	14,930,975
Flax, manufactures of	20,428,391	17,472,755	16,603,242	14,456,046	13,915,902	14,413,600	14,692,842
Silk, manufactures of	29,890,035	23,996,782	24,380,923	23,745,967	21,830,159	19,837,972	24,013,398
" unmanufactured	20,433,938	8,250,806	11,071,259	8,247,617	7,156,944	8,363,015	5,034,555
Woolen carpets	4,388,257	3,649,863	2,643,932	1,521,092	674,011	398,389	367,105
" dress goods	19,447,797	21,162,635	19,759,488	14,216,221	12,549,867	12,055,806	12,436,861
Other woolen, not underwear	26,026,724	21,565,581	21,522,525	16,800,902	11,918,163	12,193,057	11,158,030
Copper, and manufactures of	3,687,096	451,636	348,071	515,228	584,712	371,518	294,707
Lead, and manufactures of	3,247,162	2,164,788	1,449,976	598,266	748,682	361,894	64,340
Tea	24,465,170	21,112,234	22,673,703	19,524,166	16,181,467	15,660,168	14,577,618
Iron and steel, and manufactures of	59,308,452	33,792,456	18,475,783	13,191,618	9,570,606	9,057,632	9,447,148
India-rubber and gutta-percha	900,187	803,830	513,979	428,575	325,113	242,564	174,137
Leather of all kinds	6,766,202	6,138,528	5,941,238	3,996,881	4,589,713	3,784,729	3,667,564
Watches and watch movements	3,274,825	2,374,394	2,285,925	1,456,809	772,432	812,582	920,599

Exports of merchandise from the United States have increased rapidly in value in recent years. In 1845 the exports were a little less than $100,000,000 in value; in 1897 the value was $710,439,441. In 1845 the imports nearly equaled the exports; in 1879 the imports were only about 63 per cent of the exports. During 1879 the exports of domestic produce of the United States to Great Britain and Ireland amounted in value to $346,485,881, being 50 per cent of the total export of domestic merchandise for the year. There was a falling off in value of $37,121,030 from the preceding year, though the quantities of the several articles were about the same, the difference being caused by a decline in prices for cotton, wheat, corn, and some other articles. In the same period the value of exports to France rose from $54,289,918 to $88,194,041, the increase being chiefly in wheat. The principal countries to which the agricultural and other products of the United States are sent stood, in the order of value of exports in 1879, as follows: Great Britain and Ireland, $346,485,881; France, $88,194,041; Germany, $56,164,394; British America, $28,281,569; Belgium, $27,470,003; Russia, $15,959,701; Netherlands, $13,802,840; Spain, $12,438,903; Cuba, $12,201,691; Italy, $8,657,403; Brazil, $8,106,928; Australia, $7,042,875; British West Indies and Honduras, $6,779,153; China, $5,930,594; Mexico, $5,400,380; Colombia, $5,199,648; Portugal, $4,897,290; Turkey, $3,989,230; Hayti, $3,148,757; Japan, $2,674,601; Austria, $2,640,648; Hawaiian islands, $2,288,178; Denmark, $2,284,784; British Africa, $2,168,076; Sweden and Norway, $2,138,461; Argentine republic, $2,033,401; Venezuela, $1,926,923; Porto Rico, $1,771,483; British Guiana, $1,719,827; French West Indies and Guiana, $1,535,768; Dutch East Indies, $1,447,510; Gibraltar, $1,297,820; Peru, $1,293,991; Chili, $1,253,555; British East Indies, $1,142,196; Central America, $1,110,603; all other countries, $8,538,276; total exports of merchandise from the United States in 1879, $699,538,742.

In the following table is a comparison of the quantities of leading articles of export for three years, with the increase in 1879 over 1876:

Commodities.	Year ending June 30—			Exports of 1879 over 1876.	Per cent Increase.
	1873.	1876.	1879.		
Indian corn, bushels	38,541,930	49,493,572	86,296,252	36,802,680	74.4
Wheat "	39,204,285	55,073,122	122,353,936	67,280,814	122.2
Wheat flour, bbls	2,562,086	3,935,512	5,629,714	1,694,202	43.0
Cotton, manufactured, yards	13,772,774	75,807,481	129,197,377	53,389,896	70.4
Locomotives, No	58	44	73	29	65.9
Mineral oil for light, gallons	158,102,414	204,814,673	331,586,443	126,771,769	61.9
Bacon and hams, lbs	395,381,737	327,730,172	732,249,579	404,519,404	123.4
Beef, fresh and salt, lbs	31,605,196	36,596,150	90,976,395	54,380,245	148.6
Butter, "	4,518,844	4,644,894	38,248,016	33,603,122	723.4
Cheese, "	80,366,540	97,676,264	141,654,474	43,978,210	45.0
Lard, "	230,534,207	168,405,839	326,658,686	158,252,847	94.0
Sugar, refined, "	9,870,738	51,840,977	72,309,009	20,468,032	39.5
Tobacco, leaf, "	213,995,176	218,310,265	322,279,540	103,969,275	47.6

The tables which follow need no special explanation:

Value of the Exports of Breadstuffs, Raw Cotton, Provisions, Mineral Oil, and Tobacco and its Manufactures, during the Fiscal Years named.

Year.	Breadstuffs.	Cotton, raw.	Provisions.	Mineral Oil.	Tobacco.
	$	$	$	$	$
1821	5,184,909	20,157,484	a3,246,817	None.	5,798,045
1830	7,071,767	29,674,883	a2,971,002	"	5,833,112
1840	15,535,926	63,870,307	a3,503,704	"	10,697,628
1850	13,086,509	71,984,616	a10,927,485	"	10,599,855
1860	24,422,310	191,806,555	16,612,443	"	19,289,975
1861	72,152,366	34,051,483	20,807,898	"	16,545,241
1862	84,183,754	1,180,113	34,686,292	b1,539,027	13,402,000
1863	80,180,332	6,652,405	53,771,543	b27,839	23,150,253
1864	63,430,254	9,895,854	47,504,323	10,782,689	26,403,819
1865	53,964,589	6,836,400	52,060,953	16,563,413	45,307,933
1866	41,249,054	281,385,223	29,508,996	24,830,887	31,438,561
1867	41,288,804	201,470,423	26,463,972	24,407,642	22,571,913
1868	69,024,059	152,820,733	30,436,642	21,810,676	26,077,987
1869	53,724,154	162,633,052	29,655,056	31,127,433	23,347,719
1870	72,250,933	227,027,624	29,175,539	32,668,960	22,705,225
1871	79,381,187	218,327,109	38,845,219	36,894,810	21,995,957
1872	84,586,273	180,684,595	59,696,670	34,058,390	26,659,921
1873	98,743,151	227,245,069	78,197,241	42,050,756	25,391,946
1874	161,198,864	211,223,580	78,338,990	41,245,815	32,968,528
1875	111,458,265	190,638,625	81,343,401	30,078,568	27,844,470
1876	131,181,555	192,659,262	89,881,747	32,915,786	25,570,538
1877	117,806,476	171,118,508	114,991,749	61,789,438	32,030,214
1878	181,777,841	180,031,484	123,556,323	46,574,974	28,484,482
1879	210,355,528	162,304,250	116,858,650	40,305,249	28,215,240

a includes tallow, hides, horned cattle, and hogs. These articles are not included in amounts for subsequent years. b. Records for 1862-3 very imperfect.

EXPORTS OF AGRICULTURAL PRODUCTS AT VARIOUS PERIODS.

Year.	Domestic Merchandise.	Products of Agriculture.	Per cent Agricultural.	Year.	Domestic Merchandise	Products of Agriculture.	Per cent Agricultural.
	$	$			$	$	
1820	58,524,878	48,095,184	82.18	1873	575,227,017	446,968,172	77.70
1840	111,660,561	92,548,067	82.93	1874	633,339,368	501,373,947	79.17
1850	134,900,233	108,605,713	80.51	1875	559,237,698	430,575,923	77.00
1860	316,242,423	256,560,972	81.14	1876	594,917,715	456,439,995	76.72
1870	455,208,341	361,188,483	79.34	1877	632,980,854	459,439,324	72.59
1871	478,115,292	368,278,292	77.03	1878	695,749,930	536,026,954	77.05
1872	476,421,478	368,852,852	77.42	1879	699,538,742	543,691,174	77.72

MERCHANDISE.

VALUE OF MERCHANDISE IMPORTED INTO AND EXPORTED FROM THE UNITED STATES FROM 1860 TO 1879, INCLUSIVE; ALSO ANNUAL EXCESS OF IMPORTS OR OF EXPORTS (SPECIE VALUES).

Year ending June 30—	Exports.		Total Exports.	Imports.	Excess Exports over Imports.	Excess Imports over Exports.
	Domestic.	Foreign.				
	$	$	$	$	$	$
1860	316,242,423	17,333,634	333,576,057	353,616,119	.....	20,040,062
1861	204,899,616	14,654,217	219,553,833	289,310,542	.....	69,756,709
1862	179,644,024	11,026,477	190,670,501	189,356,677	1,313,824	.....
1863	186,008,912	17,960,535	203,964,477	242,325,815	.....	39,371,368
1864	143,504,027	15,333,961	158,837,988	316,447,283	.....	157,609,295
1865	136,940,248	29,089,055	166,029,303	238,745,530	.....	72,716,377
1866	337,518,102	11,341,420	348,859,522	434,812,066	.....	85,952,544
1867	279,786,809	14,719,232	294,506,141	395,761,096	.....	101,254,955
1868	269,389,900	12,562,999	281,952,899	357,436,440	.....	75,483,541
1869	275,166,697	10,951,000	286,117,697	417,506,379	.....	131,388,682
1870	376,616,473	16,155,295	392,771,768	435,958,408	.....	43,186,640
1871	428,398,908	14,421,270	442,820,178	520,223,684	.....	77,403,506
1872	428,487,131	15,690,455	444,177,586	626,595,077	.....	182,417,491
1873	507,033,439	17,446,483	522,479,922	642,136,219	.....	119,656,298
1874	569,433,421	16,849,619	586,283,040	567,406,342	18,876,698	.....
1875	499,284,100	14,158,611	513,542,711	533,005,426	.....	19,562,725
1876	525,582,247	14,802,424	540,384,671	460,741,190	79,643,481	.....
1877	589,670,224	12,804,996	602,425,220	451,328,126	151,152,094	.....
1878	680,709,268	14,156,498	694,865,766	437,051,532	257,814,234	.....
1879	698,340,790	12,098,651	710,439,441	445,777,775	264,661,666	.....

TOTAL COMMERCE OF THE UNITED STATES.

The following table exhibits the combined value of merchandise and specie imported into and exported from the United States in the years named. It affords an expression of the aggregate foreign commerce of the country:

VALUE OF MERCHANDISE AND OF GOLD AND SILVER COIN AND BULLION IMPORTED INTO AND EXPORTED FROM THE UNITED STATES FROM 1860 TO 1879, INCLUSIVE (SPECIE VALUES).

Year end'g June 30—	Exports.		Total Exports.	Imports.	Total Imports and Exports.	Excess Exports over Imports.	Excess Imports over Exports.
	Domestic.	Foreign.					
	$	$	$	$	$	$	$
1860	373,189,274	26,933,022	400,122,296	362,166,254	762,288,550	37,956,042	.....
1861	238,699,486	20,645,427	249,344,913	335,650,153	584,995,006	.....	86,305,240
1862	210,688,675	16,869,466	227,558,141	205,771,729	433,329,870	21,786,412	.....
1863	241,937,474	26,123,584	268,121,058	252,919,920	521,040,978	15,201,138	.....
1864	243,977,589	20,256,940	264,234,529	329,562,895	593,797,424	.....	65,328,366
1865	201,558,372	32,114,157	233,672,529	248,555,652	482,228,181	.....	14,883,123
1866	420,161,476	14,742,117	434,903,593	445,512,156	880,415,751	.....	10,608,565
1867	334,763,005	20,611,508	355,374,513	417,831,571	773,206,084	.....	62,457,059
1868	353,135,875	22,601,126	375,737,001	371,624,808	747,361,809	4,112,193	.....
1869	318,082,663	25,173,414	343,256,077	427,314,255	780,570,332	.....	94,058,178
1870	420,500,275	30,427,159	450,927,434	462,377,587	913,305,021	.....	11,450,153
1871	512,802,267	28,459,899	541,262,166	541,493,708	1,082,755,874	.....	231,542
1872	501,285,371	22,769,749	524,055,120	640,338,766	1,164,393,886	.....	116,283,646
1873	578,938,085	28,149,511	607,088,496	663,617,147	1,270,705,643	.....	56,528,651
1874	629,133,107	23,780,338	652,913,445	595,861,248	1,248,774,693	57,052,197	.....
1875	583,141,229	22,433,624	605,574,853	553,906,153	1,159,481,005	51,668,700	.....
1876	575,620,938	21,270,035	596,890,973	476,677,871	1,073,568,844	120,213,102	.....
1877	652,804,962	25,832,495	658,637,457	492,097,540	1,150,734,997	166,539,917	.....
1878	707,771,153	20,834,738	728,605,891	466,872,846	1,195,478,737	261,733,045	.....
1879	715,895,825	19,541,057	735,436,882	466,073,775	1,201,510,657	269,363,107	.....

This immense commerce is done mainly by foreign vessels. In 1856 the percentage carried in American vessels was 72.2; in 1879 it was only 23. There has been a gradual but regular decrease of ocean trade in American vessels since 1868.

IMPOST, the point where an arch rests on a wall or column. It is usually marked by horizontal moldings, but sometimes these are absent, especially in Gothic architecture, where different forms of impost are used. These have been classed by prof. Willis as—1st, "the *continuous* impost," where the arch moldings are carried down the pier; 2d, "the *discontinuous* impost," where the arch moldings abut and are stopped on the pier; 3d, "the *shafted* impost," where the arch moldings spring from a capital, and are different from those of the pier—the form used in the best Gothic; 4th, "the *banded* impost," where the pier and arch have the same moldings; but the impost is marked by a band of horizontal moldings, as is frequently the case in Italian-Gothic buildings. These simple forms of impost are sometimes used together, so as to produce more complex combinations.

IMPOSTORS, THE THREE, the name of a work supposed to have been written against the Jewish, Christian, and Mohammedan religions, and often mentioned since the 19th century. Its title is *De tribus Impostoribus*. Its genuineness is doubtful.

IMPOTENCY, in law, is a good ground for either of two married parties annulling the marriage, if the impotency existed at the time the contract was entered into. The defect must be proved. The law is uniform in the United Kingdom.

IMPOUNDING A DOCUMENT occurs where a document is produced in course of a trial or hearing before a court or judge, who, instead of giving it up to the owner, retains it, in order to enable a prosecution to be brought if necessary.

IMPOUNDING CATTLE is, in English law, the remedy given to all occupiers of land against the cattle of strangers which stray on such land. It amounts, in fact, to taking and keeping the cattle as a security for the damage which has been done. The occupier is then said to distrain the cattle *damage feasant*. This he does by seizing and driving them to the nearest pound, if there is one within three miles—i. e., an inclosed place kept for the purpose—or he may put them in premises of his own. In either case, he is bound to feed and water the cattle at the expense of the owner of such stray cattle, who can only recover them back by paying these expenses and the damage done, or on giving security, and bringing an action of replevin (q.v.) to try the right. The cattle cannot be distrained unless they are at the time actually trespassing upon the land. In Scotland, a similar right exists, called the *pounding* of stray cattle.

IMPRESSMENT was once the mode formerly resorted to of manning the British navy. The practice had not only the sanction of custom, but the force of law, for many acts of parliament, from the reign of Philip and Mary to that of George III., had been passed to regulate the system of impressment. Impressment consisted in seizing by force, for service in the royal navy, seamen, river-watermen, and at times landsmen, when state emergencies rendered them necessary. An armed party of reliable men, commanded by officers, usually proceeded to such houses in the seaport towns as were supposed to be the resort of the seafaring population, laid violent hands on all eligible men, and conveyed them forcibly to the ships of war in the harbor. As it was not in the nature of sailors to yield without a struggle, many terrible fights took place between the press-gangs and their intended victims—combats in which lives were often lost. In point of justice there is little, if anything to be said for impressment, which had not even the merit of an impartial selection from the whole available population.

In recent times, when volunteers fail, a system of bounties (q.v.) has been resorted to; and it is not very probable that recourse will be again had to impressment. At the same time, the laws sanctioning it slumber, without being repealed.

Under the laws all eligible men of seafaring habits are liable between the ages of 18 and 55; but exemptions are made in favor of apprentices who have not been two years apprenticed, fishermen at sea, a proportion of able seamen in each collier, harpooners in whalers, and a few others. A press-gang could board a merchant-vessel or a privateer of its own nation in any part of the world, and carry off as many of the best men as could be removed without actually endangering the vessel. The exercise of this power made a privateer dread a friendly man-of-war more than an enemy, and often led to as exciting a chase as when enemies were in pursuit of each other; for the privateer's men were the best sailors for their purpose the naval officers could lay hold on.

IMPRISONMENT. The power of imprisonment for non-payment of debt, as well as by way of punishment for crime, has always been held to be inherent in courts of justice. In criminal proceedings also, a person may, by a warrant of a justice of peace, be imprisoned before trial, provided the justice considers it is not a proper case for allowing bail; and as a general rule, though in minor offenses an accused person may insist on being discharged on tendering sufficient bail, yet in more serious crimes it is always in the discretion of the justice to accept or refuse the bail tendered, and on his refusal, application may be made to judges of the common law courts to accept bail. As regards imprisonment for debt, it is now competent only in cases where there is fraud in contracting or contempt in not paying it. In one case, however, and one only, a person

may be imprisoned before judgment has been obtained—viz., where he is about to leave the kingdom. In such a case the creditor requires to make an affidavit of the debt or cause of action before a judge, and may obtain a *capias* to arrest the defendant, who will not be released, except on bail, until judgment is obtained. With regard to debts under £20, which are generally sued for in England in the county court, though the defendant cannot be imprisoned on a judgment for less than that amount, yet if he willfully disobey the judgment of the court, which ordered him to pay by installments or on a time certain, and if the debt was originally contracted by means of fraud, the judge can commit him for contempt, and thus imprison him on another ground. In cases of insolvency it is no longer an act of bankruptcy to suffer imprisonment for debt, but absenting one's self from business, leaving England, making a fraudulent assignment, etc., is an act of bankruptcy, and he may be adjudicated a bankrupt and his estate distributed in the usual way by the court of bankruptcy. But in general, if a person wishes to be made a bankrupt, he can become so without the necessity of being imprisoned. It was also a doctrine of the law of England that if a debtor was once imprisoned for debt it operated as complete satisfaction, and his land or goods could not then be taken. But the debtor could get out of prison through the bankruptcy court, which required him to give up everything to the creditors.

In Scotland imprisonment for debt has not been abolished as yet; and it is competent to imprison a debtor if the debt exceed £8 6s. 8d. An absconding debtor may also be arrested if *in meditatione fugæ*—i. e., about to leave the country, in which case bail or caution is required. In Scotland imprisonment for debt is not considered satisfaction of the debt, and the creditor may at the same time poind his goods and adjudge his land, and take other concurrent remedies.

IMPRISONMENT (*ante*) is the restraint of a person's liberty for any cause whatever, whether by authority of the government or in defiance thereof. In the latter case it is "false imprisonment." It does not necessarily imply a prison with bolts and bars, but may be exercised by an array of force, lawfully or unlawfully, in the open street. A man becomes a prisoner wherever he may be, by the mere word or touch of a duly authorized officer directed to that end. Usually, however, imprisonment is understood to imply an actual confinement in some jail or prison employed for the purpose according to the provisions of law. The power to imprison is, in many cases, inherent in courts or magistrates, and in others conferred upon them by statute, and it may be employed in civil as well as criminal proceedings. Imprisonment for debt, once universal in this country, under the operation of the English common law, is now generally abolished by statute, except in cases where the action of the debtor is tainted by fraud, or he is reasonably suspected of an intention to avoid his debt by concealing his property, or removing that and himself from the state. Witnesses whose testimony is necessary for the conviction of a criminal, often are imprisoned to prevent their escape from the jurisdiction of the court. Persons accused of crime are either confined till the day of trial, or released on bail, according to the gravity of the offense. Courts have the power to imprison for contempt of their authority, and persons found guilty of crime are imprisoned for periods definitely fixed by statute or by the judgment of the court. The confinement of lunatics in asylums appointed for the purpose is not here considered, as such asylums are not usually regarded as prisons. A person who wrongfully or illegally deprives another of liberty may be sued in a civil action for false imprisonment by the person aggrieved, or prosecuted as for a criminal offense. A prisoner desiring release is entitled to a writ of *habeas corpus* to obtain the judgment of a competent court as to the legality or illegality of his imprisonment.

IMPROBA'TION, a Scottish law-term, meaning the disproving or setting aside a deed on the ground of falsehood or forgery.

IMPROMPTU, in music, a short extemporaneous composition. See also FANTASIA.

IMPROPRIA'TION, the transfer to a layman of the revenues of a benefice to which the cure of souls is annexed, with an obligation to provide for the performance of the spiritual duties attached to the benefice. The practice of *impropriation* differs from the somewhat similar but more ancient usage of *appropriation*, inasmuch as the latter supposes the revenues of the appropriated benefice to be transferred to ecclesiastical or quasi ecclesiastical persons or bodies, as to a certain dignitary in a convent, a college, a hospital; while impropriation implies that the temporalities of the benefice are enjoyed by a layman; the name, according to Spelman, being given in consequence of their thus being *improperly* applied, or diverted from their legitimate use. The practice of impropriation, and still more that of appropriation, as in the case of monasteries, etc., and other religious houses, prevailed extensively in England before the reformation; and on the suppression of the monasteries, all such rights were (by 27 Henry VIII. c. 28, and 31 Henry VIII. c. 13) vested in the crown, and were by the crown freely transferred to laymen, to whose heirs have thus descended not only the right to tithes, but also in many cases the entire property of rectories. The spiritual duties of such rectories are discharged by a clergyman, who is called a vicar, and who receives a certain portion of the emoluments of the living, generally consisting of a part of the glebe land of the parsonage, together with what are called the "small tithes" of the parish.

IMPROVING LEASE, a lease, in Scotland, by which the tenant undertakes to keep the premises in repair; called a repairing lease in England.

IMPROVISATO'RI, an Italian term, designating poets who utter verses without previous preparation on a given theme, and who sometimes sing and accompany their voice with a musical instrument. The talent of improvisation is found in races in which the imagination is more than usually lively, as in the Arabs, and in many tribes of negroes. Amongst the ancients, Greece was the land of improvisation. In modern Europe, it has been almost entirely confined to Italy, where Petrarch, in the 12th c., introduced the practice of singing improvised verses to the lute; and down to the present day, the performances of improvisatori constitute one of the favorite entertainments of the Italians. Females (*improvisatrices*) have frequently exhibited this talent in a high degree. Improvisation is by no means limited to brief poems of a few verses and of very simple structure, but is often carried on with great art, and in the form and to the length of a tragedy or almost of an epic poem. But when the productions of the most admired improvisatori have been given to the world through the press, they have never been found to rise above mere mediocrity. It is worthy of notice that the greater number of the celebrated improvisatori of Italy have been born in Tuscany or the Venetian territories. Siena and Verona have been especially productive of them. Some of the principal are Serafino d'Aquila (died 1500), Metastasio (q.v.), who soon abandoned the art, Zucco (died 1764), Serio and Rossi (beheaded at Naples, 1799), Gianni (pensioned by Bonaparte), and Tommaso Sgricci (died 1836). The best-known *improvisatrices* are Magdalena Moralli Fernandez (died 1800), Teresa Bandettini (born 1756), Rosa Taddei (born 1801), Signora Mazzei (probably the first in point of talent), and more lately Giovannina Milli.

IMPULSIVE MADNESS. The approaches of mental disease are generally slow and perceptible; but instances occur where, without announcement, without any preliminary stage of disease or disturbance, an individual, apparently hitherto of sound mind, is suddenly seized with mania, presents symptoms of incontrollable violence, perpetrates acts of atrocity or absurdity, altogether inconsistent with his previous disposition and deportment; and then, nearly as quickly, subsides into his ordinary state and habits, retaining no, or a very imperfect, recollection of the events which occurred during the paroxysm. It is not, however, in the suddenness or shortness of the paroxysm that the essential characteristic consists. During the continuance of such an affection, three mental conditions are distinctly traced: 1. The sudden birth and irresistible dominion of a propensity; 2. The abolition or impairment of the apprehension of the real and ordinary relations of the individual; and 3. The suspension of the powers by which such propulsions are prevented from arising, or ruled and regulated when they do arise. Alienation of this kind has been chiefly recognized when the instincts are involved; and the most striking illustrations are derived from cases of homicidal or sanguinary tendency, simply because the results may convulse society, or come under the notice of courts of law. But many examples exist of brief periods of aberration which could not be instigated by passion, and involved nothing criminal. A lady is mentioned who never entered church but she was impelled to shriek, or saw plate-glass but she was impelled to break it; and the incongruous laughter, the grotesque gesticulations, and the involuntary and repulsive associations to which good and great men have been subject, must all be placed under this category.

Marc, *De la Folie considérée dans ses Rapports avec les Questions Medico Judiciaires*, t. i. p. 219, and t. ii. p. 473.

IMPUTA'TION is one of the most common technical expressions in Christian theology. It is meant to denote the transference of guilt or of merit of punishment or reward. The doctrine of the imputation of sin, for example, is the doctrine which inculcates that all mankind are sharers in the fact and consequences of Adam's fall from innocence; and the correlative doctrine of the imputation of Christ's righteousness is that which inculcates that the merit or righteousness of Christ is transferred to those who believe in him, or, in other words, that they become sharers in his merit or righteousness. This idea of transference of intercommunication of good and evil, is a pervading one in Christian theology, and answers to undoubted realities of the spiritual life; but the idea is also apt to become degraded and materialized, and has become so in some of its common representations in popular theology. The doctrine of the imputation of Adam's sin, for example, expresses to some minds not only the idea of the participation of the human race in the consequences of Adam's transgression, so that, because he sinned and fell from innocence, they, the inheritors of his corrupt nature, also sin, and are involved in the miseries of a sinful state; but, moreover, the idea, that the sin of Adam in its direct guilt and wickedness is transferred to his posterity. They reason after this manner: it is undeniable that man suffers on account of original sin; but suffering and sin are inseparably connected. If man suffers on account of original sin, therefore, it is only because he is guilty of it. The sin of Adam in eating the forbidden fruit is equally the sin of his posterity. According to this mode of reasoning, there is a formal imputation of the sin of Adam to all his descendants. God is supposed, as it were, to charge the one to the account of the other, and by a direct and arbitrary act to hold mankind guilty because Adam fell. To give a logical justification to this view, it is assumed that God entered into a covenant with Adam (see COVENANT), by which the latter was

regarded as a representative of the whole human race; so that when he fell, all mankind sinned and fell with him. In the same manner, the merit or righteousness of Christ is supposed to be *imputed* to believers by a direct and formal transference of the one to the account of the other. In both cases it is the idea of formal and arbitrary exchange that is prominent; and according to some theologians, this idea alone answers to *imputation* of sin or of righteousness. To *impute* sin, is to deal with a *man as a sinner*, not on account of his own act, or at least not primarily on this account, but on account of the act of another; and to *impute* righteousness, is to deal with man as righteous, not because *he is so*, but on account of the righteousness of Christ *reckoned as his*, and received by faith alone. The act of another stands in both cases for our own act, and we are adjudged—in the one case condemned, in the other acquitted—not for what we ourselves have done, but for what another has done for us.

This is a fair illustration of the tyranny which technical phrases are apt to exercise in theology as in other things. When men coin an imperfect phrase to express a spiritual reality, the reality is apt to be forgotten in the phase, and men play with the latter as a logical counter, having a force and meaning of its own. *Imputation of sin* and *imputation of righteousness* have in this way come to represent legal or pseudo-legal processes in theology, through the working out of the mere legal analogies suggested by the word. But the real spiritual reality which lies behind the phrases in both cases is simple enough. *Imputation of sin* is, and can be nothing else than the expression of the spiritual unity of Adam and his race. Adam "being the root of all mankind," the stock which has grown from this root must share in its degeneracy. The law of spiritual life, of historical continuity, implies this, and it requires no arbitrary or legal process, therefore, to account for the sinfulness of mankind as derived from a sinful source. We are sinners because Adam fell. The fountain having become polluted, the stream is polluted. We are involved in his guilt, and could not help being so, by the conditions of our historical existence; but, nevertheless, his sin is not our sin, and cannot in the strict sense be imputed to us, for sin is essentially voluntary in every case—an act of self-will, and not a mere quality of nature; and my sin, therefore, cannot be another's, nor another's mine. In the same manner, the highest meaning of the imputation of the righteousness of Christ lies in the spiritual unity of the believer with Christ, so that he is one with Christ, and Christ one with him, and in a true sense he becomes a partaker of the divine nature. The notion of legal transference is an after-thought—the invention of polemical logic—and the fact itself is deeper and truer than the phrase that covers it. *The race one with Adam*, the *believer one with Christ*, are the ideas that are really true in the phrases *imputation of sin* and *imputation of righteousness*. The logic of theology has evolved many more applications of the phrases, but these applications are rather the refinements of theological pedantry than the expression of true spiritual relations.

INACHUS, a name in Grecian mythology given to a river in Argos, and also to the god of the river. When Neptune and Juno disputed about the possession of Argos, and Inachus decided for Juno, Neptune is said to have dried up the river. Inachus is described also as the first king of Argos and leader of the Argives from the mountains to the plains, from whom Argos is called Inachian.

INA'GUA, GREAT and LITTLE, are the two most southerly islands of the Bahama group, the former of which, measuring 50 m. by 25, is remarkable for having its longer dimension placed almost at right angles to those of the rest of the cluster. The Little Inagua lies about 12 m. n., and measures 8 m. by 6. The pop. of both islands together is about 1000, of whom only a small proportion are white.

INAJA' PALM, *Maximiliana regia*, a South American palm, common in the countries near the Amazon; having a lofty, massive stem; very long, drooping, pinnate leaves, with leaflets in groups of three, four, or five at intervals along the midrib, from which they stand out in different directions; numerous spadices; large woody spathes; and densely clustered elongate fruit, with a hard stony seed, a layer of soft pulp, and a tough skin. The leaves are sometimes more than 50 ft. long. The great woody spathes are used by hunters to cook meat in, and with water in them, they stand the fire well enough for the purpose. They are also used as baskets and as cradles by the Indians. The fruit is eaten by the Indians, and is particularly attractive to monkeys and some kinds of birds.

INANI'TION. See STARVATION.

INARCH'ING, or GRAFTING BY APPROACH, a mode of grafting by which branches are united together before any of them is separated from its original stem. Branches growing across one another sometimes unite in this way of themselves, and it is supposed—not improbably—that an observation of this circumstance first led to the invention of grafting. Inarching is practiced in cases in which the ordinary modes of grafting are not found readily to succeed, as with camellias. The stocks to be grafted upon are planted, or placed in pots, around the plant from which the grafts are to be taken. Four or five months are generally sufficient to complete the union, but sometimes even two years are necessary. When the union is complete the scion is separated by a sloping cut from its parent plant. Care must always be taken that the parts to be joined together be cut so as to fit one another pretty exactly, and they are then firmly tied together, and so

covered that neither air nor water may penetrate. It is desirable that they be branches of nearly the same thickness. They should be cut almost down to the pith, but the pith must not be injured. Inarching is performed in spring, after the sap has begun to circulate. There are several ways of inarching. For example, two branches of a tree may be bent so as to meet and strike upon a wound in the main stem, by which a gap will be filled up; one growing tree either from the ground or a pot, may be led to unite with another; or several suckers may be led from the ground archwise to strike upon a point in the stem, thus bringing fresh aid to the productive part of the tree. By means such as these, quickset-hedges are sometimes thickened like a net-work, so as greatly to improve their appearance and protective qualities.

IN ARTICULO MORTIS, a phrase used in Scotland to denote a deed executed on death-bed. As a general rule, such a deed, in Scotland, operating like a will, may be set aside by the heir-at-law. But a will in England having the same effect cannot be set aside on that ground.

INCANTA'TION, like *enchant*, is derived from a Latin root meaning simply "to sing," as *charm* is only a disguised form of *carmen*, a song. It is the term in use to denote one of the most powerful and awe-inspiring modes of magic (q.v.), viz., that resting on a belief in the mysterious power of words solemnly conceived and passionately uttered.

There is in the human voice, especially in its more lofty tones, an actual power of a very wonderful kind to stir men's hearts. When to this we add that poetic utterance is a special and exceptional gift; that the language of primitive nations is crude and unmanageable, the words being as difficult to weld together as pieces of cast-iron; that it is only when the poet's mind has risen to unusual heat that he can fuse them into those rhythmical sequences that please the ear and hang together in the memory; that, in short, his art is a mystery to himself—an inspiration; we need not wonder at the feeling with which everything in the form of verse or meter was viewed.

The singing or saying of such compositions, which could thus stir the blood of the hearers, they knew not how, what other effects might it not produce? Accordingly, there is no end to the power ascribed to incantations, especially when accompanied, as they generally were, with the concocting of drugs and other magical rites. They could heal or kill. If they could not raise from the dead, they could make the dead speak, or "call up spirits from the vasty deep," in order to unveil the future. They could extinguish fire; darken the sun or moon; make fetters burst, a door or a mountain fly open; blunt a sword; make a limb powerless; destroy a crop, or charm it away into another's barn.

The prayers of heathens, whether for blessings or for curses, partake largely of the nature of magical incantations. They are not supposed to act as petitions addressed to a free agent, but by an inherent force which even the gods cannot resist. This notion is very prominent in Hinduism and Buddhism; but it more or less disguisedly pervades all superstitious worship. "They think they shall be heard for their much speaking."

For almost every occasion or operation of life, there were appropriate formulas to be repeated in order to secure success; and many of these, with that reverence for antiquity and conservative tendency which always characterize superstition, continue to live in popular memory, although often the words are so old as to be unintelligible. The Romans, in the days of Cato, used incantations, for curing dislocations, full of words the meaning of which had been lost. A form of words used to this day in Shetland for healing a sprain can be traced back to the 10th century. In its earliest form, as found in an old German manuscript, it narrates how Woden and Baldur riding out to hunt, Baldur's horse dislocated its foot, and how Woden, using charmed words, set bone to bone, etc., and so healed the foot. The repetition of this rhymed narration acted as a charm to heal other lamed horses. The modern version of this tradition, as current in Norway, makes the accident happen to the horse of *Jesus*, and Jesus himself perform the cure. In Shetland, also, it is the Lord, meaning Jesus, that is substituted for Woden; and the formula is applied to the healing of persons' limbs as well as those of horses. The operation is thus described in R. Chambers's *Popular Rhymes of Scotland:* When a person has received a sprain, it is customary to apply to an individual practiced in casting the "wresting-thread." This is a thread spun from black wool, on which are cast nine knots, and tied round a sprained leg or arm. During the time the operator is putting the thread round the affected limb, he says, but in such a tone of voice as not to be heard by the bystanders, nor even by the person operated upon:

Our Lord rade,
His foal's foot slade;
Down he lighted,
His foal's foot righted.
Bone to bone,
Sinew to sinew,
Blood to blood,
Flesh to flesh.
Heal, in name of the Father, Son, and Holy Ghost.

INCARNA'TION (Lat. *in*, and *caro, carnis*, flesh), a term much used in theology concerning the union of the divine nature of the Son of God with human nature in the

person of Christ. We read in John, i. 14, that "the Word was made flesh;" but this is understood not as signifying a change of nature, but an assumption of human nature into personal union with the divine nature. In accordance with Luke, i. 35, and other texts of Scripture, the formation of the human nature of Christ is ascribed to the Holy Ghost. The reality of the human nature of Christ was much disputed in the first ages of Christianity, but in our times the chief dispute as to the person of Christ relates to his divine nature. Whilst the doctrine of the incarnation is generally asserted by all who profess Christianity, except Unitarians (q.v.), no explanation of it is attempted or deemed possible. It is regarded, however, as a doctrine fraught with most important consequences, affecting the whole system of Christianity. In the doctrine of the incarnation, it is maintained that in union with the divine nature of the Son of God, there was, and is, in the person of Christ, not only a true human body, but a human "reasonable" soul.

INCARNATION, THE (*ante*). The coming of the Son of God in human flesh is the great fact which gives unity to the Scriptures and reveals God to men. Before it was accomplished it was prefigured in a series of preliminary manifestations of the Deity in human form, to whom the Scriptures ascribe the names Angel Jehovah, Jehovah, and God. See JEHOVAH. The incarnation of God in Jesus Christ, fully denied by some, indeterminately held by many more, but by the great majority of thinkers in Christendom accepted in various forms of philosophic statement, may be briefly outlined from the Scriptures on whose testimony it rests. A permanent and perfect union of the Divine being and the human nature has been constituted in human history in the person of Jesus the Christ, and this not as creating a unity previously non-existent, but as restoring and historically developing a perfectly *natural* union. 1. That this would be done was foretold by prophecy. (1) It promised that the Messiah of God would be a man. The first announcement of a deliverer was made after the fall of man, in the Lord's declaration to Satan under the guise of the serpent: "I will put enmity between thy seed and the seed of the woman; he shall bruise thy head and thou shalt bruise his heel." The promise to Abraham was that in him and his seed (whence, according to the flesh, Christ came) all the families of the earth should be blessed. Jacob's prophecy implied that the Shiloh, the giver of peace, would be a descendant of Judah. The Lord's covenant with David was that, in the distant future, his exalted son should sit on his throne. David describes the mortal suffering of a man whose soul should not be given up to the dead, nor his body to the corruption of the grave. Isaiah foretold that a child would be born who should exercise government on the throne of David; that a man would be as a covert from the tempest; and that the anointed servant of the Lord would be a man of sorrows, rejected of men, bearing the sins of many, and that he would die and be buried. Jeremiah prophesied that there would be raised up to David a righteous branch and prosperous king. Daniel was instructed by the angel that, at the time appointed, the Messiah would be cut off, but not for himself. Zechariah proclaimed the man whose name is "the Branch;" who would be a king and priest on his throne; would be lowly, riding on the foal of an ass; and be smitten as the shepherd of the flock. Micah announced that the promised ruler of Israel would be born at Bethlehem. (2) Prophecy declared that the Messiah would be a divinely human personality. David called him who in the future would sit on his throne, his lord; saying, Jehovah said to my lord, sit thou on my right hand. Therefore, since in his human nature he was to be David's son, he must possess also the divine personality in order to be David's lord. Isaiah foretold that the name of the child to be born and to rule over the kingdom of David would be Wonderful, Counselor, the mighty God, the father of eternity—that is, according to the Hebrew idiom, the Eternal. Jeremiah prophesied that the name of the future righteous son of David would be Jehovah our righteousness. Zechariah said that the man who would be smitten as the shepherd is the "fellow" of Jehovah; and that he whose feet would stand on the Mount of Olives is Jehovah. Micah declared that the going forth to rule of him who would be born in Bethlehem was only one of those goings forth which have been from of old, even from everlasting. Malachi gives the closing assurance that the angel of the covenant, the Messiah, who would suddenly come to his temple, is the Lord. 2. The New Testament declares that the union of the divine being and the human nature has been historically constituted in the person of Jesus Christ. (1) It speaks of him as a man of the house and lineage of David; narrating his birth, childhood, youth, manhood, words, works, sufferings, and death; recording more than 60 times his own application to himself of the title, the Son of Man; and saying that he ate, spake, heard, slept, walked, wept, and became weary; ascribing to him the emotions, affections, and sentiments of a true humanity. (2) It ascribes to him a personality properly divine: recording more than 100 times the application to him of the title Son of God in a sense in which it is not given to any other being; appropriating to him hundreds of times the title Lord, which corresponds to Jehovah in the Old Testament; affirming that he was "the Word" which was in the beginning with God, was God, and is the true God; assigning to him the attributes of God; prescribing for him the worship and honor due to God, and attributing to him the works of God. (3) Affirming his pre-existence in the bosom of the Father—and his even then continuing existence therein—together with his historical assumption of the

human nature, the New Testament teaches that he unites the true divine being and the true humanity in one person. It declares that the Son to whom it was said, "Thy throne, O God, is forever and ever," was brought into this world; that the Word who was with God and was God became flesh and dwelt among men, some of whom saw his glory, the glory as of the only-begotten of the Father; that he who was in the form of God took on himself the form of a servant, and was made in the likeness of men; that that which was from the beginning, the word of life, the eternal life which was with the Father, manifested in the world, was heard, seen, gazed on, and touched by men; that God was manifested in the flesh; and that he who is a descendant from the whole scriptural line of the fathers, is also over all, God blessed forever.

The view, not widely spread but ably advocated, that Christ was in no strict and proper sense the incarnation of God, does not base itself on the Scriptures, though seeking incidental confirmations in them. On the point under consideration, it stands in either a philosophical or a historical denial, usually in both; and this denial involves at least one of three modes of dealing with the Bible: (1) a refining of its language into a sense far from the ordinary use of words; (2) a doubt of the correctness of the scriptural documents as documents, in view of their liability to accidental changes in their transmission from antiquity; (3) a denial of the original authority of the Scriptures as a declaration of truth—this denial extending beyond the question of their infallibility, beyond that of their divine inspiration, to that of their truthfulness as mere human history or of their truthfulness as the testimony of men who claimed to be eye-witnesses of the facts which they record.

Philosophically, the incarnation of God touches the deepest problems; and historically its principle is traceable through many distortions in the great religions of the world.

INCAS. See PERU.

INCENDIARY LETTER, a letter threatening to burn the house or premises of a person, generally called a threatening letter. To send such a letter is felony, punishable by three years' penal servitude. The offense is punishable in Scotland according to the discretion of the court.

INCENDIARY SHELLS, another name for carcasses (q.v.).

INCENSE (Heb. *miktar*, *ketter*, and *kitturoth*), a perfume, the odor of which is evolved by burning, and the use of which, in public worship, prevailed in most of the ancient religions. The incense at present in use consists of some resinous base, such as gum olibanum, mingled with odoriferous gums, balsams, etc. There is no regular formula for it, almost every maker having his own peculiar recipe. The ingredients are usually olibanum, benzoin, styrax, and powdered cascarilla bark. These materials, well mingled, are so placed in the censer or thurible as to be sprinkled by falling on a hot plate, which immediately volatilizes them, and diffuses their odor through the edifice.

Among the Jews, the burning of incense was exclusively employed as an act of worship, and, indeed, would appear to have been in itself regarded in the light of a sacred offering. The same would also appear for the religion of Egypt; but the Persian sculptures exhibit the burning of incense as one of the marks of honor offered to royalty.

In the Catholic church, both of the west and of the east, incense is used in public worship, more particularly in connection with the eucharistic service, which is regarded as a sacrifice; but writers are not agreed as to the earliest date at which its use can be traced. St. Ambrose, in the western church, alludes to incense in terms which suppose the practice of burning it to be an established one; and in later writers, it is mentioned familiarly as a part of ordinary public worship. In the Roman Catholic church incense is used in the solemn (or high) mass, in the consecration of churches, in solemn consecrations of objects intended for use in public worship, and in the burial of the dead. There are also minor incensations of the celebrating bishop or priest and inferior ministers; of prelates, princes, and other dignitaries officially present at the public service, and a general incensation of the whole congregation.

In the reformed churches, the use of incense was abandoned at the same time with other practices which have been laid aside by them as without "warrant of Scripture."

INCENSED, or ANIMÉ, an epithet applied in heraldry to panthers or other wild beasts borne with flames issuing from their mouths and ears.

INCEST (Lat. *in*, not; *castus*, chaste) is the marrying of a person within the Levitical degrees. In the old ecclesiastical law (now obsolete), and in Scotland, it comprehends cohabitation irrespective of marriage. The law of England enforced these prohibitions by several statutes in the reign of Henry VIII., which are still in force. Recent cases have determined that a marriage between a widower and his deceased wife's sister comes within these rules, and is void, and it makes no difference that the marriage was celebrated in a foreign country, as, for example, Denmark, where these marriages are legal, provided the parties were domiciled in England, and went there merely to evade the English law. It has also been decided in England that the same rules which apply between legitimate relations apply between natural relations, though one is illegitimate—as, for example, between a man and the daughter of an illegitimate

sister of his deceased wife. Though incestuous marriages are utterly void in England, still it is not a criminal offense to marry incestuously, not even in those cases in which the connection is most abhorrent to the moral sense of mankind, and the remedy in the ecclesiastical courts may be considered obsolete. In Scotland incest, which is calculated on the same grounds, not only makes a marriage void, but the better opinion is that to marry incestuously, as well as to commit incest, is a capital offense. See MARRIAGE.

INCH, a Gaelic word, corresponding to Irish *innis*, and signifying island (q.v.); the same root appears in Lat. *ins*-ula. Inch and innis enter into many compounds, as Inchcolm (q.v.), Inniscattery, an island in the estuary of the Shannon.

INCHBALD, ELIZABETH SIMPSON, 1753–1821; b. England; was the daughter of a farmer, and distinguished herself as an actress, dramatic author, and novelist. After failing in her first attempts on the stage, she married Inchbald, the comedian, who trained her in the dramatic art, and with him she acted in several theaters in England, and in Edinburgh, with applause. After his death she wrote plays, and played at Covent Garden for nine years, and then devoted herself with success to literary pursuits. Her published works are dramas translated from German and French; *The British Theater*, 47 vols.; *The Modern Theater*, 10 vols.; a collection of *Farces*, 7 vols.; and a Romance in 4 vols. *A Simple Story*, translated into several European languages, and *Nature and Art*, have been very popular. Her *Memoirs*, a work of much interest, compiled from an autograph journal kept for 50 years, were published in 1833.

INCHCOLM (of old, "St. Colm's Inch," as in Shakespeare's *Macbeth*, act i. sc. 2; in Lat. *Aemonia*, and *Insula Sancti Columbæ*), an islet, beautifully placed in the firth of Forth, within sight of Edinburgh. It is separated from the n. of Fife shore by a channel less than a mile broad, called "Mortimer's Deep." The isle is somewhat more than half a mile in length, and less than a third of a mile broad where widest. It had a pop. in '71 of 6. It takes its name from St. Colm or Columba (q.v.) of Iona, who is said to have dwelt here while laboring for the conversion of the northern Picts in the 6th century. In the year 1123 king Alexander I. of Scotland, being shipwrecked upon it, found it inhabited by a solitary hermit, who lived on shell-fish and the milk of one cow, and served St. Columba in a little chapel or oratory. The king, in gratitude for his escape, founded on the island an abbey of Austin canons regular. Walter Bower, the enlarger and continuator of the *Scotichronicon* of John of Fordun (q.v.), was abbot of the monastery from 1418 till 1449. It was repeatedly sacked by the English during the 14th, 15th, and 16th centuries. The buildings, which have long been in ruins, show traces of Romanesque work (of about the middle of the 12th c.); but are chiefly first pointed (of the 13th and 14th centuries). The tower has some resemblance to the tower of Iona. The oldest edifice is a little vaulted oratory (20 ft. long by 7 broad), believed to represent the chapel in which king Alexander found the anchorite serving St. Columba in the 12th century. It is of the same type as the Irish oratory of Gailerus. It has been lately restored. There is also a chapter-house with a groined roof, and three elegant sedilia. The history of Inchcolm has been written with great detail by prof. sir James Y. Simpson, in the *Proceedings of the Antiquaries of Scotland*, vol. ii. pp. 489–528.

INCHKEITH, an island in the firth of Forth, nearly midway between Leith and Kinghorn. It is a mile in length, and not much more than a third of a mile broad where widest. Its pop. in '71 was 9. It is believed to be the site of the town or stronghold of Giudi, described by Bede (who wrote about 731 A.D.) as situated in the middle of the great arm of the sea which runs into Britain from the e. (that is, the firth of Forth). From the island fortress of Giudi, the inlet in which it stood was of old called "the sea of Giudin," and hence also, probably, Inchkeith took its name. The island is said to have been the site of a church or monastery, founded between 679 and 704 A.D. by St. Adamnan, the biographer of St. Columba, and his successor in the abbacy of Iona. Inchkeith was seized by the English in 1547, when they built a fort, which, in 1549, was taken by the French auxiliaries of Scotland, who gave the island the name of the "Isle of Horses." A light-house was built on the site of the fort in 1804. The island, which belongs to the duke of Buccleuch, is part of the parish of Kinghorn, in Fife.

INCIDENCE, ANGLE OF. See CATOPTRICS.

INCIDENT DILIGENCE. In Scotch law, letters of incident diligence are issued to compel the attendance of witnesses and havers at a trial. In England, a subpœna and a subpœna *duces tecum* are similar writs.

INCIPITUR, in English law, the formal commencement of a judgment in a common law court.

INCLEDON, BENJAMIN CHARLES, 1764–1826; b. England. Educated as a musician in the choir of Exeter cathedral, he excelled as a ballad-singer for 25 years. He visited the United States in 1817, but his voice had failed through age, and he was not greatly successful, though his singing in the old cathedral in New York was long remembered.

INCLINED PLANE, THE, is reckoned one of the mechanical powers (q.v.), because by rolling it up a plane, a man may raise a weight which he could not lift. The

principle is extensively made use of, chiefly in the raising of weights and in road-making. It is here unnecessary to go into a mathematical investigation of the theory of the inclined plane, as it may be seen in the common books on mechanics, but the result is as follows: The force required to lift a body (viz., its weight) bears to the force required to keep it from rolling down an inclined plane, the same proportion that the length of the inclined plane bears to its height; also the weight of the body bears to the weight which tends to bend or break the inclined plane, the same proportion that the length of the plane bears to its base. Let us suppose a plane, whose length is 13 ft.; base, 12 ft.; and height, 5 ft.; and let the weight be 780 lbs. Then the force which can sustain 780 lbs. on the inclined plane is five-thirteenths of 780, or 300 lbs. (i.e., a force which could just lift 300 lbs.); also the force which presses perpendicularly on the plane is twelve-thirteenths of 780, or 720 lbs. When the weight has not only to be sustained on the plane but drawn up it, the resistance of friction (q.v.) has to be added to the power necessary to sustain the weight. In common roads, engineers are agreed that the height of an incline should not exceed one-twentieth of the length, or, as they phrase it, the *gradient* should not be greater than one in twenty. It may here be mentioned that knives, chisels, axes, wedges, and screws are merely modifications of the inclined plane, but the last two being generally classed as distinct mechanical powers, will be treated each under its own head.

IN CŒNA DOMINI, a celebrated papal bull, so called from the ancient day of its annual publication, Holy Thursday. It is not, as other bulls, the work of a single pope, but with additions and modifications at various times, dates back from the middle ages; some writers tracing it to Martin V., others to Clement V., and some to Boniface VIII. Its present form, however, it received from the popes Julius II., Paul III., and finally Urban VIII., in 1627, from which year it continued for a century and a half to be published annually on Holy Thursday. The contents of this bull have been a fertile subject of controversy. It may be briefly described as a summary of ecclesiastical censures, especially of those with which grievous violation of the faith of the church, or of the rights of the church or of the Roman see, are visited; excommunication being denounced against heresy, schism, sacrilege, usurpation of the rights of the church or of the pope, forcible and unlawful seizure of church property, personal violence against ecclesiastics, unlawful interruption of the free intercourse of the faithful with Rome, etc. The bull, however, although mainly dealing with offenses against the church, also denounces under similar censures other crimes, as piracy, plunder of shipwrecked goods, forgery, etc. This bull, being regarded by most of the crowned heads of Europe as an infringement of their rights, encountered in the 17th c. the determined opposition of nearly all the courts, even the most Catholic; and at length, in 1770, Clement XIV. discontinued its publication, which has never since been renewed.

INCOMBUSTIBLE FABRICS have of late years become of great importance, owing to the terrible frequency of death from the ignition of clothing; the search, however, after some means of rendering garments incombustible has continued from a very early period (see Beckmann's *History of Inventions*). After many more or less successful attempts by Gay-Lussac and other chemists, Messrs. Versmann & Oppenheim communicated to the British association at Aberdeen, in 1859, the results of a series of experiments for rendering linen, calico, muslin, and all other vegetable fibers uninflammable.* They found that many salts possessed this power, but at the same time some of these injured the fabric, spoiled the color, or were so very expensive as to render their general use impossible. Two, however, viz., tungstate of soda and sulphate of ammonia, produced the best results without injuring the tissue or color of the fabric. The first of these acts physically by preventing contact with the air, and does not interfere with the processes of ironing and starching; it is therefore preferable for goods requiring washing. The best method of applying it is by mixing in the proportion of 4 oz. of tungstate of soda to 1 dram of phosphate of soda (to prevent the formation of a partially insoluble bitungstate), and dissolving the whole in an imperial pint of water. For fabrics which are worn without previous washing, sulphate of ammonia is preferable, and a solution containing 7 per cent of the crystalline salt is a perfect preservative. In printed muslins of a madder purple, however, a slight paleness of color is produced, but in no other case is the color affected, nor does it interfere with the ironing process. It is to be regretted that these simple and efficacious preservatives have not come into general use.—The incombustible fabrics of the ancients were formed of asbestos (q.v.).

INCOME-TAX, a tax imposed on all persons having incomes above a certain amount, whether from lands or labor. Various acts have passed from time to time to impose this tax—the first introduced by Pitt, and latterly revived in 1842 by sir Robert Peel, since which date it has been continued—the fairness and public policy of which have given rise to long and endless controversy. See TAXATION.

INCOME TAX (*ante*). An income tax has been very unpopular in both England and the United States. Even its advocates are in favor of leaving incomes below a certain amount untaxed altogether. In England incomes under £100 are exempt, and those

* Silks, worsteds, and animal fibers may be ignited and charred, but they do not burst into flame, because the gases they yield are not inflammable; vegetable fibers, on the other hand, largely evolve carbureted hydrogen.

between £100 and £150 pay a lower percentage. One-sixth of the revenue of Great Britain is said to be derived from this source. In the United States the government imposed an income tax from 1863 to 1872, exempting at first $600, and levying 5 per cent on all incomes above that to $5,000, 7 per cent on those from $5,000 to $10,000, and 10 per cent on all above $10,000. The tax afterwards was exempted on $1000 and later on $2000 The largest amount received from personal incomes was $61,000,000 in 1866 from nearly half a million persons assessed. The receipts in 1867 were $27,418,000; in 1868, $23,390,000; in 1869, $27,353,000; in 1870, $26,153,000. The income tax expired by limitation at the close of 1871.

INCOMMEN'SURABLE MAGNITUDES, or INCOMMENSURABLE QUANTITIES, are those which have no common measure, i.e., are not, both of them, multiples of the same unit, however small that unit be taken. Examples of incommensurable magnitudes are abundant in mathematical science. Thus, the side and diagonal of a square; the diameter and circumference, or diameter and area of a circle, etc.; 2 and $\sqrt{3}$; $\sqrt{5}$ and $\sqrt{7}$, etc. The term incommensurable magnitudes is used in arithmetic to denote two numbers which have no common measure greater than unity.

INCORPORA'TIONS. See CORPORATIONS.

INCORPO'REAL HEREDIT'AMENT. See HEREDITAMENT.

INCUBA'TION, THE PERIOD OF, or the duration of the time in which birds sit on their eggs before the young are hatched, varies in different species, but is nearly constant in each. In the humming-birds, the smallest animals of this class, it is only 12 days; in canaries, it is from 15 to 18 days; in the common fowl, it is 21 days; in the duck, it is from 28 to 30 days; in the guinea-fowl, it is 28 or 29 days; in the turkey, 30 days; and in the swan, from 40 to 45 days. A certain degree of heat (about 104°) is necessary for the development of the young bird; that of the sun is sufficient, during the day, to hatch the eggs of some birds (for example, the ostrich) inhabiting tropical countries, but in general the mother keeps up a suitable temperature by placing the eggs in a warm and carefully constructed nest (q.v.), and by covering them with her own body. In some cases, the male bird takes part in this duty; usually, however, his services are restricted to providing his mate with food.

Eggs may, however, be hatched without the aid of the parent bird. From time immemorial, the Egyptians have hatched eggs by artificial warmth in peculiar stoves called *mammals*. In 1777 Mr. Bonnemain devised an apparatus by which, for several years before the French revolution, he supplied the Parisian markets with excellent poultry, at a period of the year when the farmers had ceased to supply it. A description of this apparatus is given in Ure's *Dictionary of Arts*, etc., 7th ed. 1875, vol. ii.

The process of artificial incubation was publicly exhibited some years ago in London, by means of the *eccaleobion machine* (derived from *ekkaleo*, I call forth, and *bion*, life), which was invented by Mr. Bucknell, and is described in his *Treatise on Artificial Incubation*. This machine possessed a perfect control over temperature from 300° Fahrenheit to that of cold water for any length of time, and "by means of this absolute and complete command over the temperature, the impregnated egg of any bird, not stale, placed within its influence at the proper degree of warmth, is, at the expiration of its natural time, elicited into life, without the possibility of failure." That chickens were hatched in large numbers by this machine is undoubted, but for some reason—probably from the process not proving sufficiently economical for commercial purposes—the *eccaleobion* has not been lately heard of. In 1825 M. D'Arce obtained chickens and pigeons at Vichy by artificial incubation effected by the thermal waters there.

INCUMBENT, the rector, parson, or vicar holding an ecclesiastical benefice in England or Ireland. It is seldom used in Scotland except popularly in a similar sense.

INCUMBERED ESTATES COURTS are tribunals, established under recent statutes, for the purpose of disposing more readily than the ordinary judicial machinery will permit, of landed property subject to incumbrances, or legal claims at the instance of other persons than the proprietors. The want of such courts was first felt in Ireland. A quarter of a century ago the rents of many Irish estates did not suffice to pay the interest of the debts created over them, and the number of such incumbered properties was increased by the abolition of the corn-laws in 1846, which lessened the demand for those products of tillage which had rendered the cultivation of the soil possible by cottier tenants. It was believed that Ireland must become a grazing country; but that it could only do so in the hands of capitalist farmers, or landlords farming their own lands, and that a complete revolution in tenure was required to put them in possession of the soil. The sluggish and expensive procedure of the court of chancery made it impossible to effect this; and it became necessary to call into existence some more simple machinery by which property could be transferred from the old to a new class of proprietors. An auction-mart rather than a legal tribunal was wanted, under the control of officers able to scrutinize titles and adjust claims on landed property with care, yet without undue delay, and authorized to sell incumbered estates in the open market, to hand over a good and simple title to the purchasers, and to divide the sum realized among the proprietors, mortgagees, and others concerned, according to their interests. To accomplish this, an act (11 and 12 Vict. c. 48) was passed in 1848; but owing to defective construction it was found inoperative. It

was followed, in 1849, by a second act (12 and 13 Vict. c. 77), the object of which was to enable any owner of land, or of a lease of land for not less than 63 years unexpired, subject to incumbrance, to apply to commissioners, appointed under it, and forming a court of record, to direct a sale. The total number of petitions presented in the eight years ending 1857 was 4,413, of which 1363 were lodged by owners. The number of absolute orders for sale during the same period was 3,547. The gross amount produced by sales from the foundation of the court up to Aug., 1859, was £25,190,839, of which there was distributed to creditors £24,229,027, including £3,692,611 allowed to incumbrancers who became purchasers. A sum of £961,809 remained in hand to satisfy unadjusted claims. At this period, however, the business before the court had almost ceased. There were, in fact, no longer mortgagees exasperated by long-suffering left to petition; all the incumbered land had been sold, and everybody with claims on it had been paid. It was then determined that the new tribunal should, with wider functions, be rendered permanent. The landed estates (Ireland) act (21 and 22 Vict. c. 72), passed in 1858, abolished the incumbered estates court, and transferred the judges and officers to the landed estates court, a permanent tribunal, with the wider functions required, and with various other powers connected with the declaration of title, partitions, exchanges, and redistribution of land. The record of title office, the counterpart of the land registry office in England, has been since placed under the direction of the landed estates court. Since the passing of the act in 1865 to Nov., 1871, 493 estates had been registered, valued at £1,715,870, the amount of mortgages recorded being £177,344. Between Nov. 1, 1858, and Jan. 31, 1862, the amount realized by sales made by the landed estates court was £5,940,990; and the approximate capital value of estates brought under its jurisdiction, but remaining unsold, £3,664,996. The rental and value of the estates sold in 1870, 1875, and 1877 are indicated in the following summary:

	1870.	1875.	1877.
Net rental of estates sold	£46,269	£63,292	£74,300
Amount of purchase money	757,218	1,209,488	1,430,453
Number of sales	201	258	310

There can be no doubt that the statutes calling into existence these courts have facilitated a great revolution in the tenure of the land in Ireland. They supplied the means by which a very great part of the soil passed rapidly from cottier tenants (i.e., laborers paying rents determined by competition) and an embarrassed and non-resident gentry to capitalist farmers and to landlords who cultivated the soil themselves, and under whom the country rapidly increased in agricultural prosperity. There can be as little doubt, however, that the process inflicted grievous injury on the tenants. It had never been usual in Ireland, as in other countries, for the landlord to bear the expense of permanent improvements. These were carried out by the tenant, who trusted to make an arrangement with regard to rent which would compensate him for his expenditure of labor or money. The sales under the incumbered and landed estates acts deprived the tenant of all power to make such claims. Increased rents were demanded under pain of eviction, and the result was that small farmers were obliged to emigrate, to remove to the towns in search of work, or remain as servants on their old farms. The Irish peasantry were not a class likely to submit quietly to such changes. Acts of retaliation and widespread discontent were the consequences, and it was found necessary to reconsider the whole subject of land tenure in Ireland. The conclusion come to was that exceptional legislation was necessary for this part of the United Kingdom; and accordingly on Aug. 1, 1870, the Irish land act was passed, which effectually checked what was described as the grievous wrong and injustice to tenants by the purchasers in the land courts. It would at present be premature to express any opinion as to the ultimate effect of the new land law on the political and social condition of the Irish people.—See *The Story of the Incumbered Estates Court*, by Percy Fitzgerald, 1862; article on the new Irish land law, in *Fraser's Magazine* for Mar., 1872; and Thom's *Irish Almanac*, which gives annually a summary of the information contained in the return made to the house of commons.

In 1854 the West Indian incumbered estates court was established under the statute 17 and 18 Vict. c. 117, entitled "an act to facilitate the sale and transfer of incumbered estates in the West Indies." The purposes and regulations were similar to those of the Irish incumbered estates act, the court of the chief commission being held, however, in Westminster, where it still sits

INCUM'BRANCES, a general term for burdens or charges on land. See HERITABLE SECURITIES, MORTGAGE, LIEN; INCUMBERED ESTATES COURTS.

INCUNAB'ULA, a Latin word signifying cradle, is employed by bibliographers to designate the first fruits of the art of printing; the books which, as Peignot has it, *touchent au berceau de l'imprimerie*. The term is usually restricted to those which appeared before the year 1500, by which time the art was completely formed in all its principal departments. The number of these works is probably not far short of 20,000. Hain, it is true, in his *Repertorium Bibliographicum*, enumerates only 16,299; but as he unfortunately died before his work was completed, it is confessedly imperfect, especially in the last volume.

Incunabula, with hardly any exceptions, belong to the category of rare books, and are therefore much sought for by collectors; but besides the interest attaching to them as lit-

erary curiosities, many of them, such as the first editions (*editiones principes*) of the Greek and Roman classics, are intrinsically valuable in a critical point of view; whilst others are important, as marking the successive steps by which the art of printing advanced towards perfection. Information as to these particulars will be found in the article PRINTING.

The principal works treating specially of incunabula are—Panzer, *Annales Typographici, ab Artis Inventæ Origine ad Annum M.D.* (continued, however, to 1536), 11 vols. 4to, Norimbergæ, 1793–1803; Maittaire, *Annales Typographici, ab Artis Inventæ Origine ad Annum* 1557 (*cum Appendice ad Ann.* 1664), 3 tom. in 5 vols. 4to, Hagæ-Comit. 1719–25; Serna Santander, *Dictionnaire Bibliographique Choisi du XVe Siècle*, 3 tom. 8vo, Bruxelles, 1805–7; and Hain, *Repertorium Bibliographicum, quo Libri omnes ab Arte Inventa usque ad M.D. Typis Expressi recensentur*, 4 tom. 8vo, Stutgartiæ, 1828–38. With all its imperfections the last is the best work we have on the subject. Much valuable information will also be found in Bernard, *De l'Origine et des Débuts de l'Imprimerie en Europe* (1853); and, on French incunabula, in Brunet's *La France Littéraire au XVe Siècle* (1865).

INDEBITATUS ASSUMPSIT, the name often given to an action for debt in England.

INDECENT EXPOSURE is a criminal offense both at common law and in England and Ireland also by statute. It is not clearly settled whether more than one person must have witnessed the indecency, in order to make it an offense. The exposure must be in some public place. By the statute 5 Geo. IV. c. 83, s. 4, the offense is punishable summarily by three months' imprisonment. To sell or expose an obscene book, print, or picture, is also punishable by fine and imprisonment and hard labor; and a warrant can be obtained under 20 and 21 Vict. c. 83, to search premises, and seize and destroy such books, etc. In Scotland indecent practices are also indictable offenses, but the law is somewhat vague, and the punishment left to the discretion of the court.

INDEMNITY DEED, in English law, is a deed given by way of security. The usual form of indemnifying a person is by giving a bond of indemnity, which operates if the engagement is not fulfilled, but otherwise becomes void. A similar bond is called generally a bond of relief in Scotland.

INDENTED, in heraldry, one of the partition lines of the shield, similarly notched to dancetté (q.v.), but with the notches much smaller, and not limited in number.

INDENTED HEAD, a peninsula in the colony of Victoria, bounds the entrance to Port Phillip on the west.

INDENTURE, the technical name given in England to a deed under seal, entered into between two or more parties with mutual covenants. Formerly it required to be actually indented—i.e., notched or toothed (Lat. *dent*, tooth), or cut in a waving line, so as to correspond with the other copy of the deed—but this is no longer necessary. The name is not used in a general sense in Scotland, except in the case of indentures of apprenticeship (q.v.), though in England it is a synonym for the kind of deeds mentioned.

INDEPENDENCE, a n.e. co. of Arkansas, traversed by the White river; 1010 sq.m.; pop. '70, 14,566. The surface is uneven. The soil is fertile, producing grain, cotton, tobacco, maize, hay, and cattle. It abounds in timber, and has valuable minerals.

INDEPENDENCE, a city in Buchanan co., Iowa, on the Wapsipinicon river, and at the junction of the Illinois Central and Burlington, Cedar Rapids, and Minnesota railroads, 65 m. w. of Dubuque; pop. '70, 2,945. It has 2 banks, 9 churches, 10 public schools, 2 newspapers, 3 fire-companies, several fine parks, and extensive fair-grounds. It is the seat also of the state insane asylum, which in 1873 contained 113 patients, and whose erection cost nearly $1,000,000.

INDEPENDENCE, a city of Jackson co., Mo., on the Union Pacific railroad, 4 m. s. of Missouri river, 10 m. e. of Kansas City, and connected with it by a railroad; pop. '70, 3,184. It has 2 banks, 2 newspapers, 3 hotels, several public schools, and 2 colleges. It was settled in 1827, and was formerly the rendezvous for the emigrant trains from the e. to California, Oregon, New Mexico, and Utah, and was occupied in 1831 by the Mormons, who were expelled in 1838 and settled in Illinois, and afterwards in Utah.

INDEPENDENCE, a t. of Washington co., Texas, 80 m. e. of Austin, 25 m. from Hempstead, on the Houston and Texas Central railroad, 12 m. from Brenham, on the w. branch of that road; pop. 1000. It has public schools, several churches, is the seat of Baylor university, and Baylor college for women, controlled by the Baptists. The university has a theological department, with 5 professors, 80 students, and a library of 2,700 volumes.

INDEPENDENCE, DECLARATION OF. See DECLARATION OF INDEPENDENCE.

INDEPENDENCE OF STATES, a term applied to states which by international law are self-governing as to their internal affairs, and also perform international acts towards other states. None of the United States being absolutely self-governing, and none having any international character, none is independent.

INDEPEN'DENTS, or CONGREGA'TIONALISTS. The distinctive principle of the Congregational church polity is that every Christian church or congregation is entitled "to elect its own officers, to manage all its own affairs, and to stand independent of, and irresponsible to, all authority, saving that only of the Supreme and Divine Head of the Church, the Lord Jesus Christ." They regard the sacred Scriptures as their only standard, and hold that human traditions, fathers and councils, canons and creeds, possess no authority over the faith and practice of Christians. Congregationalism denies that there is any authority in Scripture for uniting the churches of a nation or province into one church or corporation to be ruled by a bishop or bishops, superior to the bishops or pastors of particular congregations, or by a presbytery or synod consisting of the pastors or elders of the several congregations of the nation or province. This is the speciality which distinguishes Independency or Congregationalism from Episcopacy and Presbytery. The term "Independent" is supposed to have originated in the incidental use of the word in an "apology" addressed in Latin and English to the British and Continental universities, about the year 1604. But the early maintainers of this form of church government were careful to repudiate certain inferences which might be drawn from the use of the word. "We do profess dependence," said one of them, "upon magistrates for civil government and protection; dependence upon Christ and his word for the sovereign government and rule of our administrations; dependence upon the council of other churches and synods, when our own variance or ignorance may stand in need of such help from them." The independence claimed was only the right of every individual church to administer its own affairs, free from the control or authoritative jurisdiction of other churches—a right compatible, it was asserted, and is still asserted, with union for the promotion of common ends, and with fraternal aid and council in cases of variance or other difficulty.

Doctrinally, the early Independents occupied the same position as the other sections of the Puritan family. They held in substance the evangelical doctrines of the Reformers, of the Westminster assembly, and of the thirty-nine articles. While declining subscription, and frankly tolerant of very considerable diversities of opinion, modern Congregationalists profess to be of one mind in regard to the cardinal truths of Christianity.

For the history of this body we must refer to the works named at the end of this article. But it may be mentioned that as early as the days of queen Elizabeth they were numerous and influential. In a speech made by sir Walter Raleigh in the house of commons in 1592, on the subject of a law to transport the Brownists —as they were offensively and untruly named—he thus refers to their numbers: "If two or three thousand Brownists meet at the sea-side, at whose charge shall they be transported? or whither will you send them? I am sorry for it, but I am afraid there is near twenty thousand of them in England; and when they are gone, who shall maintain their wives and children?" Several eminent men of this body suffered death for their opinions; others were condemned to banishment. The greater part retired to Holland. Numbers sought an asylum in New England; and America still cherishes the memory of the Pilgrim Fathers as the founders of those institutions which are the sources of her freedom, her intellectual and moral power, and her national elevation.

By the passing of the act of uniformity in 1662, the Independents, along with other nonconformists, were subjected to much suffering. The act required an express assent and consent to everything contained in the revised prayer-book, and its effect was to cause 1900 or 2,000 of the clergy to leave the church. Still the Independents increased; and the revolution of 1688, and passing of the toleration act in 1689, at length brought them relief. Efforts were made about this time to bring about an accommodation between them and the English Presbyterians; and in 1691 heads of agreement were drawn up, but with little practical result. In 1730 Presbyterians, Baptists, and Independents formed themselves into a united body, under the name of the three denominations, for the protection of their civil and religious liberties. The Independents are the largest dissenting body in England except the Wesleyan Methodists. By the census of 1851 the number of their churches in England and Wales is given at 3,244, with accommodation for 1,067,760 persons, and an estimated attendance of 793,142 (see article GREAT BRITAIN). There has been no general religious census since 1851, but it is well known that the Independent body has very largely increased. The largest confederation of its churches is "the Congregational Union of England and Wales," which is careful to lay down in its basis the principle that "it shall not, in any case, assume legislative authority, or become a court of appeal."

An Independent church is, from its very constitution, at liberty to choose any man for its minister whom it considers qualified for the office—subject only to the check arising from the fact that neighboring ministers will refuse to ordain or recognize a man whom they have reason to regard as disqualified. But from the beginning the Independents have attached great importance to an educated ministry. Their leaders in the Puritan age, such as Owen, Howe, and Greenhill, were men of great learning, and, as soon as the act of toleration in 1689 allowed, measures were taken for securing a succession of educated men. They have now eleven theological colleges in England and Wales. These are (with the number of students in 1876):

	Date of Formation.	No. of Students.
Western college, Plymouth	1752	15
Rotherham college	1756	14
Brecon college	1760	35
Airedale college, Bradford	1784	14
Hackney college	1796	20
Lancashire college	1806	47
Spring Hill, Birmingham	1838	13
New college, London	1850	43
Bala college	1842	30
Bristol institute	1863	14
Nottingham institute	1863	44

In this list "New college" is a union of three older colleges, Homerton, Highbury, and Coward. The college at Cheshunt, belonging to lady Huntingdon's trustees, was founded for the preparation of young men for the Christian ministry, in any section of the church to which they might be called. But it is virtually an independent college—all its present professors and almost all its students being Independents. The "Carmarthen Presbyterian college," though governed by Dr. Williams's trustees who are Unitarians, has an Independent for its theological professor, and 28 Independent students. The Congregationalists of Scotland have a theological hall in Edinburgh. There are two colleges in Australia and one in Canada.

In Scotland Independency may be traced back to the days of the commonwealth, during which it was imported by the chaplains and soldiers of Cromwell. But the present Independent churches in Scotland owe their origin mainly to a missionary movement in the end of the last century chief among the leaders of which were the brothers Robert and James Haldane, Graville Ewing, John Campbell, and John Aikman. The Haldanes became Baptists in course of time—a circumstance which greatly divided and weakened the new community. The formation of an academy for the training of ministers in 1811, and of the Congregational union about the same time, did much to restore the lost vigor of the body. There are about 100 churches at present in this "union." It should be added that the Baptist churches, both in England and Scotland, are as strictly "Independent" as those which bear that name.

In America the first Independent church was founded by John Robinson at Plymouth, New England, in 1620. In 1637 the spread of Antinomian doctrine caused much discussion in the church. By a synod convened in New England Antinomianism was unanimously condemned. In 1638 Harvard college was founded. In 1658 the Savoy confession was adopted. It still remains in force. About 1750 Unitarian principles spread widely in the Congregational churches of America. In 1785 a separation took place between the Unitarians and the Trinitarians, but both still retain the Congregational form of church government. Harvard college is Unitarian. "Congregationalism," according to Dr. Schaff, "is the ruling sect of the six north-eastern states, and has exerted, and still exerts, a beneficial influence upon the religious, social, and political life of the whole nation." At present the number of Congregational churches in the United States is upwards of 2,500, with more than 320,000 church-members, and nearly 400,000 children in Sabbath-schools. Exclusive of Harvard and other colleges, in the administration of which they have a share, the American Independents possess theological seminaries at Andover, Bangor, New Haven, Oberlin, Hartford, Oakland (California), and Chicago. The reader may consult the following works with advantage: Dr. Vaughan's *History of English Nonconformity;* J. Fletcher's *History of Independency;* Waddington's *Early History;* Hanbury's *Memorials;* Neal's *History of the Puritans;* Dr. Stoughton's *Ecclesiastical History of England;* and Mosheim's *General Church History.*

INDEPENDENTS (*ante*). See CONGREGATIONALISM.

INDETERMINATE PROBLEMS. It was shown in the article EQUATIONS that the values of the unknown quantities could only be determined when the number of equations was equal to the number of unknown quantities, but that, if the latter exceeded the former, *several* values might be found for each unknown, in which case the problems which give rise to the equations are called *indeterminate problems.* For example, "To find the number which, when divided by 2 and 3, leaves remainders 1 and 2," is an indeterminate problem, admitting of an infinite number of solutions; for though only one unknown quantity appears in the question, yet, in order to form an equation, we are obliged to proceed in the following manner: as x is divisible by 2, with a remainder 1, $x = 2p + 1$; again, as x is divisible by 3, with a remainder 2, $x = 3q + 2$; hence we have the equation $2p + 1 = 3q + 2$ (one equation to find two unknown quantities), from which, by a process which is explained in the ordinary books on algebra, we find $x = 6r - 1$, where r is any positive number whatever. The values of x are, therefore, 5, 11, 17, 23, etc. In general, if the equation is of the form $ax + by = c$, the number of pairs of values (of x and y) is finite; but if of the form $ax - by = c$, the number is infinite. The Diophantine (q.v.) analysis exhibits a very interesting class of indeterminate problems of the second degree.

INDEX (more fully INDEX LIBRORUM PROHIBITORUM), a catalogue published by papal authority in the Roman Catholic church of books the reading of which is prohibited to members of that church, whether on doctrinal, moral, or religious grounds. As a natural consequence of the claim of the Catholic church to authority in matters of religion, and to infallibility, that church also claims the right or the duty of watching over the faith of its members, and of guarding it against every danger of corruption, the chief among which is held to be the circulation of books believed to be injurious to faith or to morality. The earliest recorded exercise of this restrictive authority is the prohibition of the writings of Arius; and a council of Carthage, in the year 398, issued, even for bishops, a similar prohibition of gentile books, although it permitted to them the reading of the works of heretics. The earliest example of a prohibitory catalogue is found in the decree of a council held at Rome (494) under pope Gelatius (*Labbe Conc.*, ii. col. 938–41), which, having enumerated the canonical books of Scripture and other approved works, recites also the apocryphal books, together with a long list of heretical authors, whose writings it prohibits, and orders to be eliminated from the churches. The mediæval popes and councils pursued the same course as to the heterodox or dangerous writings of their respective periods, and the multiplication of such books after the invention of printing led to a more stringent as well as more systematic procedure. The university press of Louvain issued in 1546, and again in 1550, a catalogue of prohibited books. Similar lists appeared by authority at Venice, Paris, and Cologne; and Pius IV. issued in 1557 and 1559 what may be regarded as properly the first Roman Index. One of the gravest undertakings of the council of Trent was a more complete and authoritative enumeration of all those books the use of which it was expedient to prohibit to the faithful. A committee was appointed for the purpose, and had made great progress in the work; but it was found impossible to bring the examination of the books to an end before the close of the council; and the entire of the papers of the committee were handed over by the council to the pope, with instructions that the work should be completed, and the result published by his own authority, which was accordingly done by Pius IV. in 1564. Further additions and certain modifications of its rules were made by Sixtus V. and Clement VII. It was republished in 1595, and with the addition of such books as from time to time it was deemed expedient to prohibit, in several subsequent editions, the most remarkable of which are those of Brasichelli (Rome, 1607); Quiroga, *Index Librorum Expurgandorum* (Salamanca, 1601); and Sotomayor, *Novissimus Index* (Madrid, 1648). The edition best known to modern theological readers is that of Rome, 1819. In the intervals between the editions, the decrees by which further additions to the Index are made, are made public at Rome, and circulated in the various countries.

The prohibitions of the Roman Index are of two classes, either absolute and total, or partial and provisional, "until the book shall have been corrected." The edition of Quiroga, mentioned above, regards the latter. The ground of the prohibition may be either the authorship of the work, or its subject, or both together. Under the first head are prohibited all the writings of *heresiarchs*—i.e., the first founders of heresies—no matter what may be the subject. Under the second head are prohibited all books confessedly immoral, and all books on magic, necromancy, etc. Under the third are prohibited all books of heretical authorship treating on doctrinal subjects; all versions of the Bible by heretical authors; and all books, no matter by whom written, which contain statements, doctrines, or insinuations prejudicial to the Catholic religion. The preparation of the Index, in the first instance, was committed to the care of the congregation of the inquisition in Rome; but a special congregation of the Index was established by Pius V., and more fully organized by Sixtus V. This congregation consists of a prefect (who is always a cardinal), of cardinals, of consulters, and of examiners of books (*qualificatores*). Its proceedings are governed by rules which have been authoritatively laid down by several popes, especially by Benedict XIV., in a constitution issued July 10, 1753, to which the reader is referred for the best and most authentic exposition of a subject on which much misconception exists on the part of Catholics as well as of Protestants.

The growth of modern literature has, of course, entirely outstripped the limited and tardy machinery of this tribunal. A very small proportion even of the most anti-Catholic publications outside of Italy find their way by name to the Roman Index; but besides the positive prohibitions of the Index itself, there are certain general rules regarding the use of books by which the freedom of what is considered perilous or pernicious reading is much limited among members of the Roman Catholic church. These, however, would be entirely beyond the scope of our publication; nor could the rules of the Index even be practically brought into operation in those countries where the Catholic and Protestant literatures are so interwoven, that it is impossible to separate them even in the ordinary intercourse of life. See Wetzer's *Kirchen-Lexicon*, art. "Index."

Few parts of the Roman Catholic system are more repugnant to intelligent Protestants than the institution of the "Index," as it strikes at the root of the fundamental principle of Protestantism itself—namely, that of private judgment. And this theoretical repugnance is increased by seeing that, in its practical working, such names as Gibbon, Robertson, Guicciardini, Sismondi, Hallam, Goldsmith (*History of England*), Des-

cartes, Locke, Kant (*Essay on Pure Reason*), J. S. Mill (*Political Economy*), Whately (*Logic*), Bacon, Milton, Addison, Dante (*De Monarchia*), etc., are put under the ban.

INDIA,* an extensive region of southern Asia, celebrated during many ages for its riches and valuable natural productions, its beautiful manufactures and costly merchandise, the magnificence of its sovereigns, and the early civilization of its people. It possesses especial interest to the Englishman, from the intimate connection of its history with that of his own country.

Hither India is the central peninsula of southern Asia, and lies in 8° 4′ to 35° n. lat., and 67° to 92° e. long. According to these limits, its length may be stated approximately at 1900 m., and its breadth, reckoned along the parallel of 25° n. lat., at 1600 m., with an area of about 1,300,000 sq. miles. The natural boundaries of this vast region are, on the n., the range of the Himalaya mountains, which separates it from Tartary, China, and Thibet; on the w., the Suliman mountains divide it from Afghanistan and Beloochistan; on the s., the Arabian sea and the gulf of Bengal; and on the e., the hill-ranges which separate Chittagong and Assam from Burmah. From the mouths of the Brahmaputra and the Indus, the e. and w. coasts, inclining towards the same point, meet at cape Comorin, and thus give to southern India the form of an irregular triangle. The two sides of the triangle have each a coast-line of about 2,000 miles. India is, in fact, from its great extent of seaboard, essentially a maritime country.

Further India is the name given to the south-eastern peninsula of Asia. It is not treated of in this article, and for information concerning it reference is made to the articles on SIAM, BURMAH, COCHIN-CHINA, etc.

Physical Features.—Hither India presents a most diversified surface and varied scenery; it has indeed been called "an epitome of the whole earth," consisting as it does of mountains far above the level of perpetual snow; broad and fertile plains, bathed in intensest sunshine, arid wastes, and impenetrable forests. Its great natural divisions are the sub-Himalayan countries, the plain of the Ganges, the plain of the Indus, the highlands of northern Hindustan, and the peninsular portion of the country to the s. of the Vindhya mountains.

The sub-Himalayan Countries form an elevated tract lying between the chief ridge of the Himalayas and the lower elevations which adjoin the plains of the Ganges and Indus. They consist of Cashmere, Gurhwal, Kumaon, Nepaul, Sikkim, and Bhotan, all hill-countries, which, owing to their elevation above the sea, have a cool climate and the vegetation of the temperate zones. These regions are separated from the plain of the Ganges by the Terai, or Great Indian swamp, which extends in a long belt, 5 to 25 m. in width, from Hurdwar to the Brahmaputra. It is covered with great forest trees, and is the haunt of innumerable wild beasts. The soil is very fertile, but malaria renders it uninhabitable by man and the domestic animals, at least from April to Oct. It is then said to be abandoned even by the wild beasts. This wilderness forms a great physical barrier between the hill-countries and the plains, and separates populations distinct from each other in race and language.

The Plain of the Ganges, which includes Bengal, Bahar, the Doab, Oude, and Rohilcund, is a vast alluvial flat, extending from the bay of Bengal to the Punjab. Throughout its entire length, the Ganges and its numerous tributaries spread out like the veins of a leaf, carrying everywhere their fertilizing influence. The population of these fertile and well-cultivated plains is very dense. Scattered over the agricultural districts, and massed in the great cities and towns, there are not less than 100,000,000 people.

The Plains of the Indus, in the n.w., are less extensive than those of the Ganges, and are separated from the latter by the Aravulli hills. The Punjab occupies the northern portion. South of the Punjab, and parallel with the river, the great sandy desert of the Indus extends for nearly 500 miles. The valley of the Indus is continued through Sinde to the ocean. The plains of the Indus may be considered to include Cutch and Gugerat, which like them slope towards the Arabian sea. Between the Indus and the Aravulli mountains lies the Thur or Indian desert, an expanse covered with sand-hills, 400 m. long and 100 broad. It is only in the neighborhood of the Indus and the Luni that the surface can be cultivated—although crops of grain may be grown in a few narrow valleys after the rains. The horse and camel alone can cross this desert, which is described in Hindu geography as "the region of death." Like the Terai, it forms a great physical barrier separating western and eastern India.

The Highlands of Northern Hindustan extend from the Vindhya mountains as a base to the border of the Thur. They include the table-land of Marwa and Rajpootana or Rajasthan, which has an elevation of about 2,000 ft. above the level of the sea.

The Peninsular Portion of India, s. of the Vindhya mountains, which remains to be considered, is called by the natives the Deccan (q.v.). The most remarkable geographical feature of this area is a central table-land—a vast plateau—extending from 12° to 21° n. lat., rising from 2,000 to 3,000 ft. above the sea, and inclosed on all sides by lofty

* The name is borrowed by the Greeks from the Persians, who, however, applied the name of Hindus at first only to the dwellers on the banks of the river *Sindhu* (Sans. for Indus). From this, by the regular change of *s* into *h*, the Persian *Hind* is derived. Hindustán (the country of the Hindus) is a modern word applied by the Persians to the whole of India; but Europeans understand it as applying properly to that portion of it which lies n. of the Vindhya mountains.

mountains, between which and the sea, on the e. and w., are narrow strips of low flat country, divided into several districts. From the low country on the coast to the central table-land the mountains rise abruptly, in a succession of gigantic terraces or steps, and hence the name of "Ghauts" (q.v.). The rivers of the Deccan rise in the western Ghauts, and after transversing the table-land, descend to the sea over the eastern Ghauts. The slope of the country corresponds with the course of the rivers; it has a gradual inclination towards the east. Ceylon, the Lacadive, and Maladive islands may also be considered to belong to this part of India.

The *Himalaya* (q.v.) and the *Suliman* mountains (see AFGHANISTAN) far exceed in altitude the chains which lie within the boundaries of India. The *Vindhya* mountains, which cross India between 22° and 25° of n. lat., and separate Hindustan proper from the southern or peninsular portion of the country, nowhere exceed 6,000 ft. in height. The Satpura range, between the Nerbudda and Tapti valleys, is a spur of the Vindhya. The *Western Ghauts* run parallel with the Indian ocean at a distance of 20 to 40 miles. At Mahabaleshwar, the sanitarium of Bombay, they rise to 4,500 ft., but they are lofty near Coorg, where one summit has an elevation of 7,000 feet. On the opposite coast, forming the south-eastern buttress of the table-land of the Deccan, are the *Eastern Ghauts* (see GHAUTS). The physical geography of southern India presents the singular phenomenon of isolated masses upheaved amidst the vast plains that occupy the greater portion of the peninsula. Of these, the most remarkable are the Neilgherries (q.v.) or Blue mountains, which cover an area of 600 sq. miles. Ootacamund (q.v.), the great sanitarium of southern India, situated in the midst of them, has an elevation of 7,400 feet. Of the minor mountain-ranges of India, the principal are the Sewalik range, near Hurdwar, rising 3,000 ft.; the Kala or Salt range, adjacent to the Suliman range, rising 2,500 ft.; the Aravulli, between the basins of the Ganges and the Indus, culminating in Mt. Abu at an altitude of 5,000 ft.; the Kattywar hills, rising from 1000 to 3,000 ft. in the center of the Kattywar peninsula; the hills of Bundelcund, 2,000 ft.; and the Rajmahal hills, rising from 5,000 to 7,000 feet.

The *river-system* of India is on a grand scale. The Indus (q.v.) traverses the n.w., and drains about 400,000 sq.m. of country. The Ganges (q.v.), on the n.e., together with its tributaries, drains an area of about 500,000 sq. miles. The Brahmaputra (q.v.) has a course of upwards of 600 m. from the point where it leaves the Himalayas to that where it enters the bay of Bengal. The eastern side of India—the region southward of the Nerbudda, and eastward of the Malabar Ghauts—is watered by 18 rivers, the principal being the Godavery, 830 m. long; Kistna, 800; Cauvery (Kaveri), 470; Mahanadi, 520; Brahmini, 400; North Pennar, 350; and the South Pennar, 240. About 20 rivers water the western side of India. The most noteworthy are the Nerbudda, 800 m. long; the Tapti, 490—both of which flow into the gulf of Cambay; the Myhi, 350 m.; Luni, 320 m.; Bunnas, 180 m.; and the Bhadro, 130 miles.

Geology.—From observations that have been made at different points in India, the general features of its geological structure are known. A staff of geologists commenced more than a quarter of a century ago a geological survey of India, which has since then been uninterruptedly proceeded with. They have already examined an area more than four times as large as that of Great Britain, and their inquiries have supplied, for the districts they have dealt with, an accurate knowledge of the mineral resources of India.

India is bounded on the n.e. by the range of the Himalayas, the great water-shed of central Asia. These mountains consist of granitic rocks which have penetrated the stratified rocks, thrown them up in endless confusion, and metamorphosed them in many places into gneiss, mica-schist, clay-slate, or crystalline limestone. Layers of sandstone and conglomerate extend along the base of the mountains. They are of the miocene age, containing the remains of species of camel, giraffe, hippopotamus, sivatherium, elephant, crocodile, and tortoise. These are extensively developed in the Sewalik hills. An immense tract of post-tertiary alluvial deposits covers the whole of the river-basins of the Ganges and the Indus, stretching across the n. of India from sea to sea. The eastern and western Ghauts consist of metamorphic rocks, which are continued across the country to the n. of the Godavery. Between this transverse band of altered strata and the diluvial deposits of the n., a large tract of country is occupied with palæozoic rocks, frequently broken through and covered with different kinds of trap, and in some places overlaid with secondary and fresh-water tertiary strata. One of the most important labors of prof. Oldham and his geological staff has been the exploration of the great Indian coal-fields. They lie in a region bounded by the Ganges on the n., and extending beyond the Godavery on the south. The coals come from one geological formation called "Damuda," from the river Damodar, in the valley of which the chief beds occur. It differs little geologically from the carboniferous beds of England. Iron, copper, and lead are worked in different parts of India. Salt is obtained from the Salt range above referred to, and produced abundantly by evaporation in the salt lakes of the Thur.

Vegetable Productions.—The vegetation of India is as varied as its soil and climate, and passes from the flora of a tropical to that of an alpine region. The groves of palm that border the coast, and, in the interior, the umbrageous mango topes, are striking features of Indian scenery. Rice is the chief article of food in India, and is produced in

all the parts of the country in which irrigation is practiced. Maize and wheat are the grains cultivated in the n.w. provinces. Opium is one of the most valuable products of India. In 1871–72 the value of the chests exported from Bombay and Calcutta to China was £6,850,000. Coffee is largely produced in Ceylon, and the cultivation of the plant is rapidly spreading in southern India. Tea cultivation is now carried on with success in Assam, and is spreading over all the hill-countries of n.w. India. Cinchona, introduced from South America in 1860, has been naturalized with great success. The cost of doing so was £61,719. "The return," Mr. Markham says, "represents a value which is simply incalculable and without price;" a cheap supply of quinine being one of the most certain means of averting the fevers that prevail in the hot and moist parts of India. As a commercial speculation the measure ultimately will prove highly remunerative. The growth of cotton has been much extended since the American war. The finest is produced in Berar. The rhea, or jute plant, is grown in Assam and Bengal, and has recently given rise to an important trade. India-rubber is another important product of Assam, the demand for which is increasing. Within the last 15 years great attention has been paid to the importance of preserving the Indian forests. The destruction of the woods was found to give rise to destructive floods, and to render the water-supply uncertain and capricious during the dry season. The Indian cultivators have been rapidly improving in prosperity, and with that improvement there has been an increasing demand for timber for house construction and furniture—a demand further augmented by the requirements of the railways. In order to protect existing forests, and extend the area of the timber-producing districts, the Indian forest conservancy department was organized, the main objects of which were the definition and demarkation of reserved forests, and the prevention of jungle fires—that is to say, of the native practice of burning forests for cultivation, and the cutting and clearing away of creepers round the young trees. The system of preparing candidates for forest service was commenced in 1867, when the first examination was held by the civil service examiners. Since that time, a large number of officers who have studied forestry in England, Germany, and France have been sent to India, and great satisfaction has been expressed with the work they have done.

Animals.—The domesticated animals are horses, asses, mules, oxen, buffaloes, sheep, and elephants. Of wild beasts the most formidable is the Bengal tiger. The other beasts of prey are leopards, wolves, jackals, panthers, bears, hyenas, lynxes, and foxes. Of poisonous snakes the cobra da capello, or black-hooded snake, the cobra manilla, and sand-snake are the most common. The number of people killed by wild beasts is a feature of Indian life. In 1869 a tigress killed 127 people, and stopped a public road for many weeks. In 1871, 14,529 were known to have lost their lives in that year by snake-bites. In 1871 the total number of deaths known to have been caused by dangerous animals of all classes was 18,078. It is believed that if systematic returns were kept, the number in British India would be found to exceed 20,000.

Climate.—In a country extending over 26° of lat.—one extremity of which runs far into the torrid zone, and the other terminates in a range of lofty mountains rising far above the line of perpetual snow—a country embracing within its ample circumference lowland plains, elevated plateaux, and alpine regions, the climate must differ greatly. Hindustan proper may be said to have three well-marked seasons—the cool, the hot, and the rainy. The cool months are Nov., Dec., Jan., and a part of Feb.; the dry hot weather precedes, and the moist hot weather follows, the periodical rains. The climate of southern India is greatly regulated by the monsoons (q.v.). The central table-land is cool, dry, and healthy. At Ootacamund, on the Neilgherries, 7,300 ft. above the level of the sea, the mean annual temperature is 57° F.; at Madras, 82°; Bombay, 84°; Calcutta, 79°; Bangalore, 74°; and at Delhi, 72°. The fall of rain varies greatly in different parts of India. A map of the Indian rainfall given by Mr. Markham in his report, published in 1873, shows that in the whole of n.e. India, from the valley of the Sutlej to the mouth of the Irrawaddy, including the sub-Himalayan countries, Assam, and British Burmah, and between the western Ghauts and the Coromandel coast, exceeds 75 inches. In the interior of the Deccan it is less than 30, and in Multan and Sinde less than 15 inches. The remainder of India is placed between the extremes represented by these damp and dry belts, but is, as compared with Europe, an arid country. Hence the necessity of tanks and irrigation canals to supply moisture to the soil, and to obviate the danger of dry seasons.

Inhabitants.—Three races widely distinguished from each other inhabit India. In the n.e. are Mongols, resembling the Thibetans and Burmese; in the s., Dravidians, the relation of whom to other great branches of the human family is still a subject of dispute; and in the n.w., Aryans. It is supposed that at a remote epoch a branch of the Aryan race (q.v.) entered the peninsula from the n.w., established themselves first in the Punjab, and thence gradually diffused themselves as a dominant race over the whole of northern and central India, imbuing the subject population more or less completely with their religious system and their language, and thus forming the Hindus. Tribes still inhabiting the mountainous districts and jungles are supposed to be outstanding islands of the aboriginal population that resisted the tide of Hindu conquest and civilization. The Hinduizing influence extended feebly, if at all, into the Deccan, the great majority of whose inhabitants, therefore, are supposed not to belong ethnologically to the Aryan race.

Professor Friedrich Müller thus distributes the Indian races according to their languages (see also the *Geographical Magazine* for Jan., 1878).

A. *Mongols*—(1) Thibetans, subdivided into Thibetans proper, in upper terraces of the Himalayas; and, s. of them, the sub-Himalayan tribes, speaking Lepcha, Kiranti, Limbu, Murmi, etc. (2) The Birman or Lohitic races, speaking Burmese, of Aracan, Kooch, Dhimal, Bodo, Garo, Miri, Singpho, Naga, Kuki, etc. (3) The Thai, or Siamese races, speaking Ahom (Assam), Khamti, etc.

B. *Dravidians*, subdivided into—(1) The Munda branch—Kol (in Chota Nagpore), Sontal, Ramusi, Warali, Bheel, etc. (2) The Dravida branch proper—Tamul, Telinga, Canarese, Malayala, Tulava, Toda, Gond, Khond, Rajamahal, Kol, Brahui (in Beloochistan). (3) The Singhalese branch in Ceylon, including the Veddahs. The Tamul, Telinga, Canarese, Malayala, Tulava, and Singhalese are spoken by cultivated races; the other languages by rude hill-tribes.

C. *Aryans*, subdivided into—(1) The races of Dardistan and the n.w. frontier, including the Siah-posh Kaffirs, and other rude tribes. (2) The Hindus, including the cultivated races speaking the following languages: Cashmiri, spoken in Cashmere; Punjabi, in the Punjab; Hindi, in various dialects sometimes described as languages, spoken in the western plain of the Ganges and Malwa; Sindhi, in Sinde; Cutchi, in Cutch; Gugerati, in Gugerat; Mahrati, in the n.w. Deccan, s. of the Vindhya mountains; and Bengali, spoken in the plain of the Ganges, e. of the bend of the river at Rajmahal; and the Orya, Assami, and Nepauli, all resembling the Bengali, and spoken in Orissa, Assam, and Nepaul by the Hindu section of the inhabitants. For an account of the connection of these languages with the old Prakrit dialects of India, see SANSKRIT and PALI.

The word Hindu is used in various senses, and it is important to guard against the confusion that may thence arise. It is applied (1) to the people speaking the Hindi dialect of the North-western Provinces; (2) to the Aryans of northern India; (3) to the cultivated races of India, both Aryan and Dravidian, who profess the Hindu religion, and have been influenced by the Indian civilization common to both. The cultivated peoples of India professing the Hindu religion, or Hindus in the third sense, not only differ in language in different provinces of India, but in customs and dress. The Mohammedan population, on the other hand, in all parts of India, wear the same dress, affect the same customs, and speak one language—Hindustani or Urdu, a dialect which sprang up at the Mohammedan court of Delhi, and which is a highly cultivated form of Hindi intermixed with a large number of Persian and Arabic words. It is the language generally used by the British government in official business. In several provinces, however, attempts have been recently made to substitute for it the local languages, such as Sindhi and Assami, many of which have received little literary cultivation.

The returns published with reference to books published in India in 1872 unfortunately do not refer to all the provinces, but they give some idea of the relative importance of the native languages. In the North-west Provinces, out of 317 books published, 90 were in Hindustani or Urdu, 53 in Hindi, 56 in Persian, 47 in Arabic, and 33 in English. In the Madras presidency, out of 508 published, 177 were in Tamil, 115 in Telugu, 26 in Malayalim, 22 in Canarese, and 70 in English. In Bombay Presidency, out of 779 books, 214 were in Mahrati, 243 in Gugerati, and 157 in English. In Bengal, 759 native books were published, but in what languages is not stated.

In India there are rude tribes belonging to the Mongol, Dravidian, and Aryan races. The Siahposh Kaffirs and kindred tribes of Dardistan are undoubted Aryans, who know nothing of Hindu culture. The Mongols n. and e. of the Terai, in the same way, have none of the culture of Bhotan, Thibet, and China. They have caused much trouble on the Assam frontier, where several districts are excluded from the operation of regular laws, and the deputy-commissioner of Assam now holds an annual meeting of the hill-tribes. From 1854 to 1865 the Angami Nagas made 19 raids into the plains, and killed 236 people; but in the latter year a military post was occupied in their country, and the raids have ceased. The hill-tribes of the Dravidian race are also in the lowest stage of savagery. Among the most important and best known of them are the Bheels, who are found in Candeish; and the Khonds and Koles, who inhabit Orissa. The former were wont to live by plunder, and used to burst out of their jungles like tigers, committing the most frightful excesses; but in 1825, after various methods of subduing them had been unsuccessfully tried by the British government, it was resolved to tempt them into military service. A Bheel corps was raised, into which all the wilder spirits were drafted, and the result has been a very decided improvement in the habits and disposition of the rest of the people. Roads have now been made through their country, and property is quite safe. The Khonds and Koles, however, are perhaps a more interesting race, since they have preserved more completely what may be regarded as the primitive religion of Hindustan. Forced into the jungles and mountains of Central India, by the victorious advance of the Aryan race from the n.w., they have preserved (in part at least), in their almost inaccessible retreats, the grim religion that prevailed in the peninsula before Brahmanism was heard of. That religion may be briefly characterized as devil-worship. The Khonds sacrifice only to malignant deities, such as Siva the destroyer, the goddess Kali, and the God of the earth, whom they seek to propitiate by human sacrifice, principally of children, who, however, are not taken from their own

race, but kidnapped from neighboring tribes. Successful efforts have been made by the British government to suppress these practices.

To the present civilized inhabitants of India, who, although generally a mixed race of Dravidian and Aryan origin, now form many distinct nations, no general statement can apply. The acute but timid Bengali resembles little the warlike Sikh of the Punjab, or the fierce Afghan of Rohilcund; and the patient weaver of Dacca is wholly unlike the high-spirited Rajpût of Central India. The Sikh is a born soldier, who despises the Hindu, and hates the Mussulman. He cares nothing for caste, and is brave, faithful, and independent. The Mohammedans of India are degenerate followers of the prophet, and their religion is a strange mixture of the doctrines of the Koran with the idolatry of Asia. The Parsees, a mercantile and educated class, seated at Bombay and along the w. coast of India, are the descendants of the fugitive fire-worshipers of Persia (see PARSEES). Of the morality of the civilized races of India, in general, Mr. Markham says that, whatever may be said of the larger towns, the residents of villages are "singularly temperate as a rule, chaste, honest, peaceful, singularly docile, easily governed, and patient."

Two of the most striking peculiarities of the social condition of the Hindus are the institution of caste (q.v.) and the *village-system*. The latter is very simple. A village in Hindustan does not mean a collection of houses at a particular spot, but corresponds rather to what is called a township in America. It is a district embracing an area of some hundreds or thousands of acres of land, and is under the administration of native functionaries, the principal of whom is the *potail* (head-inhabitant), a kind of chief magistrate, who superintends the affairs of the community, settles disputes, attends to the police and the collection of taxes. Among the other functionaries may be mentioned the *curnum*, who keeps a register of the produce and the names of the proprietors, and draws up all deeds of sale, transfer, etc.; the Brahman, or village priest; and the schoolmaster. Besides these, every village has its astrologer, smith, carpenter, potter, barber, doctor, dancing-girl, musician, and poet, all of whom are rewarded for their labors out of the produce of the village lands. "Under this simple form of municipal government, the inhabitants of the country have lived from time immemorial. The boundaries of the village have been but seldom altered; and though the villages themselves have been sometimes injured, and even desolated by war, famine, and disease, the same name, the same limits, and even the same families, have continued for ages. The inhabitants give themselves no trouble about the breaking up and division of kingdoms; while the village remains entire, they care not to what power it is transferred, or to what sovereign it devolves; its internal economy remains unchanged; the potail is still the head-inhabitant, and still acts as the petty judge and magistrate, and collector, or renter of the village."

Religion.—Hinduism or Brahmanism is the religion of the great majority of the inhabitants of India. Mohammedanism comes next, and it appears, from the last census, that the number of persons professing this creed is much greater than had been supposed. Of the 66,000,000 forming the population of Bengal, 21,000,000 are Mohammedans. In the Punjab, 9,000,000 are Mohammedans and 6,000,000 Hindus. In Oude there are 1,000,000 of Mohammedans to 10,000,000 of Hindus. In the North-western Provinces there are 25,000,000 of Hindus to 4,000,000 of Mohammedans. In the whole of India it is believed there are nearly three times as many Hindus as Mohammedans. The Sikh religion (see SIKHS) is professed, according to the census for the Punjab, by 1,000,000 of the inhabitants. They hate alike the Hindus and the Mohammedans. Buddhism at one period prevailed very generally throughout India; it is now confined to Bhotan, Ceylon, and the Burmese frontier. Several of the forms of religion prevalent among the natives of India are treated of apart (see BUDDHISM, MOHAMMEDANISM, PARSEES, SIKHS); what we shall here specially consider is that variety of creeds which is derived from Brahmanic sources, and known as the Hindu religion, or Hinduism. The term Hinduism, however, must not be taken as restricted to those forms of the Brahmanic religion which are in existence now; we have to look upon it as comprising all the phases of this creed up to its earliest period.

We may divide Hinduism into three great periods, which, for brevity's sake, we will call the Vedic, Epic, and Purânic periods, as our knowledge of the first is derived from the sacred books called the *Veda;* of the second, from the epic poem called the *Râmâyana*, and more especially from the great epos, the *Mahâbhârata;* while the chief source of our information relative to the last period is that class of mythological works known under the name of *Purânas* and *Tantras*. It is necessary here to guard the reader against attempting to connect dates with the earlier of those periods. It has not been uncommon for writers on this subject to assign thousands of years before the Christian era as the starting-points of various phases of Hindu antiquity; others, more cautious, marked the beginnings of certain divisions of Vedic works with 1200, 1000, 800, and 600 years B.C. The truth is, that while Hindu literature itself is almost without known dates, owing either to the peculiar organization of the Hindu mind, or to the convulsions of Indian history, the present condition of Sanskrit philology does not afford the scholar the requisite resources for embarking with any chance of success in such chronological speculations. This question of Hindu chronology will be more particularly considered in the article VEDA. In the mean time, the utmost stretch of

assumption which in the actual condition of Sanskrit philology it is permitted to make is, that the latest writings of the Vedic class are not more recent than the 2d c. before Christ. A like uncertainty hangs over the period at which the two great epic poems of India were composed, although there is reason to surmise that the lower limits of that period did not reach beyond the beginning of the Christian era. The Purânic period, on the other hand, all scholars are agreed to regard as corresponding with part of our mediæval history.

If the *Rig-Veda*—the oldest of the Vedas, and probably the oldest literary document in existence—coincided with the beginning of Hindu civilization, the popular creed of the Hindus, as depicted in some of its hymns, would reveal not only the original creed of this nation, but throw a strong light on the original creed of humanity itself. Unhappily, however, the imagination, indulging in such an hypothesis, would have as little foundation to work on as that which would fix the chronological position of this Veda. The Hindus, as depicted in these hymns, are far removed from the starting-point of human society; nay, they may fairly claim to be ranked among those already civilized communities experienced in arts, defending their homes and property in organized warfare, acquainted even with many vices which only occur in an advanced condition of artificial life. See VEDA. Yet in examining the ideas expressed in the greatest number of the Rig-Veda hymns, it cannot be denied that they are neither ideas engendered by an imagination artificially influenced, nor such as have made a compromise with philosophy. The Hindu of these hymns is essentially engrossed by the might of the elements. The powers which turn his awe into pious subjection and veneration are—*Agni*, the fire of the sun and lightning; *Indra*, the bright, cloudless firmament; the *Maruts*, or winds (see MARUT); *Sûrya*, the sun (see SÛRYA); *Ushas*, the dawn (see USHAS); and various kindred manifestations of the luminous bodies, and nature in general. He invokes them, not as representatives of a superior being, before whom the human soul professes its humility; not as superior beings themselves, which may reveal to his searching mind the mysteries of creation or eternity, but because he wants their assistance against enemies—because he wishes to obtain from them rain, food, cattle, health, and other worldly goods. He complains to them of his troubles, and reminds them of the wonderful deeds they performed of yore, to coax them, as it were, into aquiescence and friendly help. "We proclaim eagerly, *Maruts*, your ancient greatness, for the sake of inducing your prompt appearance, as the indication of (the approach of) the showerer of benefits;" or: "Offer your nutritious viands to the great hero (*Indra*), who is pleased by praise, and to *Vishnu* (one of the forms of the sun), the two invincible deities who ride upon the radiant summit of the clouds as upon a well-trained steed. *Indra* and *Vishnu*, the devout worshiper glorifies the radiant approach of you two who are the granters of desires, and who bestow upon the mortal who worships you an immediately receivable (reward), through the distribution of that fire which is the scatterer (of desired blessings)." Such is the strain in which the Hindu of that period addresses his gods. He seeks them, not for his spiritual, but for his material welfare. Ethical considerations are therefore foreign to these instinctive outbursts of the pious mind. Sin and evil, indeed, are often adverted to, and the gods are praised because they destroy sinners and evil-doers; but one would err in associating with these words our notions of sin or wrong. A sinner, in these hymns, is a man who does not address praises to those elementary deities, or who does not gratify them with the oblations they receive at the hands of the believer. He is the foe, the robber, the demon—in short, the borderer infesting the territory of the "pious" man, who, in his turn, injures and kills, but, in adoring Agni, Indra, and their kin, is satisfied that he can commit no evil act. Yet we should be likewise wrong did we judge of those acts of retaliation by the standard of our own ethical laws. So far, indeed, from reflecting unfavorably on the internal condition of the Hindu community, the features of which may be gathered from these hymns, they seem, on the contrary, to bespeak the union and brotherhood which existed amongst its members; and the absence, in general, of hymns which appeal to the gods for the suppression of internal dissensions or public vices, bears, apparently, testimony to the good moral condition of the people whose wants are recorded in these songs.

It may be imagined that the worship of elementary beings like those we have mentioned was originally a simple and harmless one. By far the greatest number of the Rig-Veda hymns know of but one sort of offering made to these gods; it consists of the juice of the soma or moon-plant, which, expressed and fermented, was an exhilarating and inebriating beverage, and for this reason, probably, was deemed to invigorate the gods, and to increase their beneficial potency. It was presented to them in ladles, or sprinkled on the sacred Kusa grass. Clarified butter, too, poured on fire, is mentioned in several hymns as an oblation agreeable to the gods; and it may have belonged to this, as we hold, primitive stage of the Vedic worship.

There is a class of hymns, however, to be found in the Rig-Veda which depart already materially from the simplicity of the conceptions we are referring to. In these, which we conceive to be of another order, this instinctive utterance of feeling makes room for the language of speculation; the allegories of poetry yield to the mysticism of the reflecting mind; and the mysteries of nature becoming more keenly felt, the circle of beings which overawe the popular mind becomes enlarged. Thus, the objects by which Indra, Agni, and the other deities are propitiated, become gods themselves; soma,

especially, the moon-plant and its juice, is invoked as the bestower of all worldly boons. The animal sacrifice, the properties of which seem to be more mysterious than the offerings of soma, or of clarified butter—is added to the original rites. We will quote a few verses from the second book of the Rig-Veda, which may illustrate the essential difference between this order of hymns and those we alluded to before. It is the horse of the sacrifice which is invoked by the worshiper, and its properties are praised in the following strain:

"Thy great birth, O Horse, is to be glorified; whether first springing from the firmament or from the water, inasmuch as thou hast neighed, for thou hast the wings of the falcon and the limbs of the deer. Trita harnessed the horse which was given by Yama, Indra first mounted him, and Gandharba seized his reins. Vasus, you fabricated the horse from the sun. Thou, horse, art Yama: thou art Aditya, thou art Trita by a mysterious act: thou art associated with Soma. The sages have said there are three bindings of thee in heaven," etc.

Mystical language like this doubtless betrays the aberration of the religious instinct of a nation; but it also reveals the fact, that the pious mind of the Hindus was no longer satisfied with the adoration of the elementary or natural powers; it shows that religion endeavored to penetrate into the mysteries of creation. This longing we find, then, expressed in other hymns, which mark the beginning of the *philosophical creed of the Vedic period.* The following few verses may tend to illustrate the nature of this third class of hymns, as they occur in the oldest Veda: "I have beheld the Lord of Men," one poet sings, "with seven sons [i.e., the seven solar rays], of which delightful and benevolent (deity), who is the object of our invocation, there is an all-pervading middle brother, and a third brother [i.e., Vâyu and Agni, the younger brothers of Aditya, the sun], well fed with (oblations of) clarified butter. They yoke the seven (horses) to the one-wheeled car [i.e., the orb of the sun, or time, or a year]; one horse [i.e., the sun], named seven, bears it along: the three-axled wheel [i.e., the day with its three divisions, or the year with three seasons—hot, wet, and cold; or time—past, present, and future] is undecaying, never loosened, and in it all these regions of the universe abide. . . . Who has seen the primeval (Being) at the time of his being born? What is that endowed with substance which the unsubstantial sustains? From earth are the breath and blood, but where is the soul? Who may repair to the soul to ask this? Immature (in understanding), undiscerning in mind, I inquire of those things which are hidden, (even) from the gods, (what are) the seven threads which the sages have spread to envelop the sun in whom all abide?" Another poet sings: "Then there was no entity or non-entity; no world, or sky, or aught above it; nothing anywhere in the happiness of any one, involving or involved; nor water deep or dangerous. Death was not, nor was there immortality, nor distinction of day or night. But THAT breathed without affiation, single with her (*Swadhâ*) who is within him. Other than him, nothing existed (which) since (has) been. . . . Who knows exactly, and who shall in this world declare, whence and why this creation took place? The gods are subsequent to the production of this world, then who can know whence it proceeded, or whence this varied world arose, or whether it uphold itself or not? He who in the highest heaven is the ruler of this universe, does indeed know; but not another one can possess this knowledge."

As soon as the problem implied by passages like these was raised in the minds of the Hindus, Hinduism must have ceased to be the pure worship of the elementary powers. Henceforward, therefore, we see it either struggling to reconcile the latter with the idea of one supreme being, or to emancipate the inquiry into the principle of creation from the elementary religion recorded in the oldest portion of Vedic poetry. The first of these efforts is principally shown in that portion of the Vedas called *Brâhmana* (see VEDA), the second in the writings termed *Upanishad* (see UPANISHAD). In the *Brâhmanas*—a word of the neuter gender, and not to be confounded with the similar word in the masculine gender, denoting the first Hindu caste—the mystical allegories which now and then appear in what we have called the second class of Vedic hymns, are not only developed to a considerable extent, but gradually brought into a systematic form. Epithets given by the Rig-Veda poets to the elementary gods are spun out into legends, assuming the shape of historical narratives. The simple and primitive worship mentioned in the hymns becomes highly complex and artificial. A ponderous ritual, founded on those legends, and supported by a far more advanced condition of society, is brought into a regular system, which requires a special class of priests to be kept in a proper working order. Some of the Vedic hymns seem to belong already to the beginning of this period of the Brâhmana worship, for in the second book of the Rig-Veda several such priests are enumerated in reference to the adoration of Agni, the god of fire; but the full contingent of 16 priests, such as is required for the celebration of a great sacrifice, does not make its appearance before the composition of the Brâhmanas and later Vedas. Yet, however wild many of these legends are, however distant they become from the instinctive veneration of the elementary powers of nature, and however much this ritual betrays the gradual development of the institution of castes—unknown to the hymns of the Rig-Veda—there are still two features in them, which mark a progress of the religious mind of ancient India. While the poets of the Rig-Veda are chiefly concerned in glorifying the *visible* manifestations of the elementary gods—in the Brâhmanas, their ethical qualities are put forward for imitation and praise. Truth and

untruth, right and wrong—in the moral sense which these words imply—are not seldom emphasized in the description of the battles fought between gods and demons; and several rites themselves are described as symbolical representations of these and similar qualities of the good and evil beings, worshiped or abhorred. A second feature is the tendency, in these Brâhmanas, of determining the *rank* of the gods, and as a consequence, of giving prominence to one special god amongst the rest; whereas in the old Vedic poetry, though we may discover a predilection of the poets to bestow more praise, for instance, on Indra and Agni, than on other gods, yet we find no intention, on their part, to raise any of them to a supreme rank. Thus, in some Brâhmanas, *Indra*, the god of the firmament, is endowed with the dignity of a ruler of the gods; in others, the *sun* receives the attributes of superiority. This is no real solution of the momentous problem hinted at in such Vedic hymns as we quoted before, but it is a semblance of it. There the poet asks "whence this varied world arose"—here the priest answers that "one god is more elevated than the rest;" and he is satisfied with regulating the detail of the soma and animal sacrifice, according to the rank which he assigns to his deities.

A real answer to this great question is attempted, however, by the theologians who explained the "mysterious doctrine," held in the utmost reverence by all Hindus, and laid down in the writings known under the name of *Upanishads*. It must suffice here to state that the object of these important works is to explain, not only the process of creation, but the nature of a supreme being, and its relation to the human soul. In the Upanishads, Agni, Indra, Vâyu, and the other deities of the Vedic hymns, become symbols to assist the mind in its attempt to understand the true nature of one absolute being, and the manner in which it manifests itself in its worldly form. The human soul itself is of the same nature as this supreme or great soul: its ultimate destination is that of becoming reunited with the supreme soul, and the means of attaining that end is not the performance of sacrificial rites, but the comprehension of its own self and of the great soul. The doctrine which at a later period became the foundation of the creed of the educated—the doctrine that the supreme soul, or (the neuter) Brahman, is the only reality, and that the world has a claim to notice only in so far as it emanated from this being, is already clearly laid down in these Upanishads, though the language in which it is expressed still adapts itself to the legendary and allegorical style which characterizes the Brâhmana portion of the Vedas. *The Upanishads became thus the basis of the enlightened faith of India.* They are not a system of philosophy, but they contain all the germs whence the three great systems of Hindu philosophy arose; and like the latter, while revealing the struggle of the Hindu mind to reach the comprehension of one supreme being, they advance sufficiently far to express their belief in such a being, but at the same time acknowledge the inability of the human mind to comprehend its essence. For the different periods which must be distinguished in the composition of these works, and for the gradual development of the general ideas briefly adverted to here, we refer the reader to the article UPANISHAD.

The EPIC period of Hinduism is marked by a similar development of the same two creeds, the general features of which we have now traced in the Vedic writings. The popular creed strives to find a center round which to group its imaginary gods, whereas the philosophical creed finds its expression in the groundworks of the *Sânkhya*, *Nyâya*, and *Vedânta* systems of philosophy. In the former, we find two gods in particular who are rising to the highest rank, Vishnu and Siva; for as to Brahmâ (the masculine form of Brahman), though he was looked upon, now and then, as superior to both, he gradually disappears, and becomes merged into the philosophical Brahma (the neuter form of the same word), which is a further evolution of the great soul of the Upanishads. In the *Râmâyana*, the superiority of Vishnu is admitted without dispute; in the great epos, the *Mahâbhârata*, however, which, unlike the former epos, is the product of successive ages, there is an apparent rivalry between the claims of Vishnu and Siva to occupy the highest rank in the pantheon; but Sanskrit philology will first have to unravel the chronological position of the various portions of this work, to lay bare its groundwork, and to show the gradual additions it received, before it will be able to determine the successive formation of the legends which are the basis of classical Hindu mythology. Yet so much seems to be clear even already that there is a predilection during this epic period for the supremacy of Vishnu; and that the policy of incorporating rather than combating antagonistic creeds, led more to a quiet admission than to a warm support of Siva's claims to the highest rank. For the character of these gods, for the relation in which the conception of these beings stands to that of the Vedic time, for the new ideas which they impersonate at the epic period, and for the group of mythological beings connected with both of them, we refer the reader to the respective articles. We will point, however, to one remarkable myth, as it will illustrate the altered position of the gods during the epic period. In the Vedic hymns, the immortality of the gods is never matter of doubt; most of the elementary beings are invoked and described as everlasting, as liable neither to decay nor death. The offerings they receive may add to their comfort and strength; they may invigorate them, but it is nowhere stated that they are indispensable for their existence. It is, on the contrary, the pious sacrificer himself who, through his offerings, secures to himself long life, and, as it is sometimes hyperbolically called, immortality. And the same notion prevails throughout the oldest Brâhmanas. It is only in the latest work of this class, the *Satapatha-Brâhmana*, and

more especially in the epic poems, that we find the inferior gods as mortal in the beginning, and as becoming immortal through exterior agency. In the *Satapatha-Brâhmana*, the juice of the soma plant, offered by the worshiper, or at another time clarified butter, or even animal sacrifices, impart to them this immortality. At the epic period, Vishnu teaches them how to obtain the *amrita*, or beverage of immortality, without which they would go to destruction; and this epic *amrita* itself is merely a compound, increased by imagination, of the various substances which in the Vedic writings are called or likened to *amrita*, i.e., a "substance that frees from death." It is obvious, therefore, that gods like these could not strike root in the religious mind of the nation. We must look upon them more as the gods of poetry than of real life; nor do we find that they enjoyed any of the worship which was allotted to the two principal gods, Vishnu and Siva.

The philosophical creed of this period adds little to the fundamental notions contained in the Upanishads; but it frees itself from the legendary dross which still imparts to those works a deep tinge of mysticism. On the other hand, it conceives and develops the notion that the union of the individual soul with the supreme spirit may be aided by penances, such as peculiar modes of breathing, particular postures, protracted fasting, and the like; in short, by those practices which are systematized by the Yoga doctrine. The most remarkable epic work which inculcates this doctrine is the celebrated poem *Bhagavadgîtâ*, which has been wrongly considered by European writers as a pure Sânkhya work, whereas *Sankara*, the great Hindu theologian, who commented on it, and other native commentators after him, have proved that it is founded on the Yoga belief. The doctrine of the reunion of the individual soul with the supreme soul, was necessarily founded on the assumption that the former must have become free from all guilt affecting its purity before it can be remerged into the source whence it proceeded; and since one human life is apparently too short for enabling the soul to attain its accomplishment, the Hindu mind concluded that the soul, after the death of its temporary owner, had to be born again, in order to complete the work it had left undone in its previous existence, and that it must submit to the same fate until its task is fulfilled. This is the doctrine of *metempsychosis*, which, in the absence of a belief in grace, is a logical consequence of a system which holds the human soul to be of the same nature as that of an absolute God. The beginning of this doctrine may be discovered in some of the oldest Upanishads, but its fantastical development belongs to the epic time, where it pervades the legends, and affects the social life of the nation. See METEMPSYCHOSIS.

The PURÂNIC period of Hinduism is the period of its decline, so far as the popular creed is concerned. Its pantheon is nominally the same as that of the epic period. Brahmâ, Vishnu, and Siva remain still at the head of its imaginary gods; but whereas the epic time is generally characterized by a friendly harmony between the higher occupants of the divine spheres, the Purânic period shows discord and destruction of the original ideas whence the epic gods arose. Brahmâ withdraws, in general, from the popular adoration, and leaves Vishnu and Siva to fight their battles in the minds of their worshipers for the highest rank. The elementary principle which originally inhered in these deities is thus completely lost sight of by the followers of the Purânas. The legends of the epic poems relating to these gods become amplified and distorted, according to the sectarian tendencies of the masses; and the divine element which still distinguishes these gods in the Râmâyana and Mahâbhârata, is now more and more mixed up with worldly concerns and intersected with historical events, disfigured in their turn to suit individual interests. Of the ideas implied by the Vedic rites, scarcely a trace is visible in the Purânas and Tantras, which are the text-books of this creed. In short, the unbridled imagination which pervades these works is neither pleasing from a poetical, nor elevating from a philosophical point of view. Some Purânas, it is true —for instance, the *Bhâgavata*—make in some sense an exception to this aberration of original Hinduism; but they are a compromise between the popular and the Vedânta creed, which henceforward remains the creed of the educated and intelligent. They do not affect the worship of the masses as practiced by the various sects; and this worship itself, whether harmless, as with the worshipers of Vishnu, or offensive, as with the adorers of Siva and his wife Durgâ, is but an empty ceremonial, which, here and there, may remind one of the symbolical-worship of the Vedic Hindu, but, as a whole, has no connection whatever with the Vedic scriptures, on which it affects to rest. It is this creed which, with further deteriorations, caused by the lapse of centuries, is still the main religion of the masses in India. The opinion these entertain, that it is countenanced by the ritual, as well as by the theological portion of the Vedas, is the redeeming feature of their belief; for, as nothing is easier than to disabuse their mind on this score, by reviving the study of their ancient and sacred language, and by enabling them to read again their oldest and most sacred books, it may be hoped that a proper education of the people in this respect, by learned and enlightened natives, will remove many of the existing errors, which, if they continued, must inevitably lead to a further, and, ultimately, total degeneration of the Hindu race.

The philosophical creed of this period, and the creed which is still preserved by the educated classes, is that derived from the tenets of the Vedânta philosophy. It is based on the belief of one supreme being, which imagination and speculation endeavor to invest with all the perfections conceivable by the human mind, but the true nature of

which is, nevertheless, declared to be beyond the reach of thought, and which, on this ground, is defined as not possessing any of the qualities by which the human mind is able to comprehend intellectual or material entity. See VEDÂNTA.

Hindu Sects.—This designation applies to the sects which arose during the third period of Hinduism. They suppose that their worship is countenanced by the Vedas; but its real origin is derived from the *Purânas* and *Tantras*. See these articles. There are three chief divisions of these sects—the adorers of Vishnu, of Siva, and of the wives or female energies of these gods. See VAISHNAVAS, SAIVAS, and SÂKTAS. Besides these great sects, there are some of limited extent and total insignificance, such as the worshipers of *Agni*, the god of fire; of *Sûrya*, the sun-god; of *Ganesa*, the god of wisdom, and the obviator of impediments. For a detailed account of these and similar sects, see the first volume of the *Works of the late H. H. Wilson*, containing a sketch of the religious sects of the Hindus.

For an account of the various divisions of India, see articles on the various provinces referred to in the preceding article. See also INDIA, BRITISH; INDIA, NATIVE STATES OF; INDIA, FRENCH; INDIA, PORTUGUESE.

For an account of the philosophy, literature, architecture, etc., of India, see SANSKRIT LITERATURE MÎMÂNSÂ, NYÂYA, SÂNKHYA, VEDÂNTA. For the history of India, see following article.

INDIA, BRITISH, is the name given to those parts of Hither and Further India placed under the administration of the viceroy or governor-general of India. It does not include Ceylon, which, although a British possession, has its government entirely separate from that of Hindustan; but it extends along the eastern coast of the bay of Bengal to 10° s. lat., and thus includes part of Further India or Indo-China.

The following are the returns of the census of 1868–72, subsequently revised and corrected:

Territories and Provinces under the Administration of	Area in English Sq. Miles.	Population.	Average Pop. per Sq. Mile.
Governor-general of India—			
Ajmere and Mairwara	2,711	396,889	146
Coorg	2,000	163,312	84
Berar	17,631	2,226,496	126
Mysore	29,325	5,055,412	172
Governor of Madras	137,971	31,672,613	230
" Bombay	124,462	16,349,206	131
Lieutenant-governor of Bengal	157,989	60,502,897	383
" North-west Provinces	81,403	30,781,204	378
" Punjab	104,975	17,611,498	168
Chief Commissioner of Oude	23,992	11,220,232	468
" Assam	53,856	4,132,019	99
" Central Provinces	84,963	8,201,519	97
" British Burmah	88,556	2,747,148	31
Total	909,834	191,065,445	210

Government.—By an act of parliament, which received the royal assent Aug. 2, 1858, queen Victoria was declared sovereign of India, and various regulations were enacted for the better government of the country. In 1877, by act of parliament, the queen formally assumed the title empress of India. The home-government of India is vested in a secretary of state, who is a member of the English cabinet. He is assisted by an under-secretary and a council of fifteen members. The Indian executive government is administered by the viceroy or governor-general appointed by the crown, and acting under the control of the secretary of state for India. The viceroy is appointed by the crown for a term of six years, and is assisted by a council of five ordinary members, three appointed by the secretary of state, two by her majesty's warrant. Each of them has charge of a department of the executive. The commander-in-chief may be constituted an extraordinary member of the council. The legislative council is composed of the members of the executive, together with twelve members, one half of whom must be unconnected with the public service. They are nominated for two years by the viceroy. British India is now divided into the provinces mentioned in the preceding table. It was formerly divided into the three presidencies of Bengal, Madras, and Bombay; and in ordinary language, and even in official documents, the name of presidency is still given to the provinces of Madras and Bombay. As regards military matters, the old threefold division may be said to subsist, but it must be kept in mind that British India is now divided into the four territories under the governor-general, and the nine provinces, enumerated in the preceding table, and that each has its own civil government, and is independent of the others. The two governments of Madras and Bombay are under the rule of governors apppointed by the crown, and assisted by executive and legislative cou cils. They communicate only with regard to important matters with the home government through the governor-general. As regards affairs of minor importance, they correspond directly with the secretary of state for India. The Lower Provinces of Bengal, the North-west Provinces, and the Punjab are administered by lieutenant-governors appointed by the governor-general, subject to the approbation of the secretary of state for India. In Bengal, the

lieutenant-governor is assisted by a legislative council. Oude, Assam, the Central Provinces, and British Burmah are governed by chief-commissioners appointed by the Indian government. Ajmere was separated from the government of the North-west Provinces in 1871, and placed under the direct control of the governor-general. Berar, also known under the name of the assigned districts of Hyderabad, Mysore, and Coorg, are administered by commissioners appointed by the governor-general. All the governments of India are split into provinces, over each of which a commissioner is placed, and these are in turn divided into districts under a judge and collector. The provinces are distinguished into regulation and non-regulation provinces. In the former the revenue is collected and justice is administered according to fixed methods. In the latter, power is reserved by legislative enactment to modify these as occasion requires. Resident political agents are appointed by the British government at the courts of the native princes. The *Covenanted Civil Service* is composed of Europeans who conduct the general administration in the Indian provinces. Since 1854 the members have been recruited from the successful candidates at competitive examinations instituted for the purpose, held in London. The *Uncovenanted Civil Service*, appointments to which are made by the authorities in India, is composed of Europeans, Eurasians (the class sprung from native mothers by European fathers), and natives. Municipalities in India were first created for the three presidency towns, and it was not till 1850, 1856, and 1868, that acts were passed under which a large number of Indian towns have obtained municipal institutions, which are gradually diffusing the habit of self-government over the whole country.

Military Force.—The Indian military service, like the civil service, underwent a thorough reorganization, consequent on the great mutiny, and the transfer of the government of the country from the East India company to the crown. In 1878 the established military force of British India numbered 190,175, including officers; of whom 123,682 were natives, and 60,227 English (exclusive of officers). India is divided into three military divisions, which, although named after the three old presidencies of Bombay, Madras, and Bengal, and perpetuating their names, have not exactly the same limits. Of the native troops, 47,000 belonged to the Bengal army, 27,000 to the Madras army, and 24,000 to the Bombay army. The British forces are chiefly stationed in the Punjab, and along the valley of the Ganges. In 1872 there were 37,000 English soldiers in these provinces, of whom 12,000 were in the Punjab, 10,400 were in the Bombay presidency, and 12,200 in that of Madras.

The Police in British India include a force of 190,000 constables or regular policemen, and the village watchmen who aid them. The minimum age of admission is 17, the maximum 21. Each district has a jail and a police superintendent; and the districts are grouped, for police purposes, into circles under deputy-inspectors-general, while the whole police force in each province is under an inspector-general. The constabulary is a purely civil force, subject in all respects, except internal discipline, to the civil authorities.

Administration of Civil Justice.—In 1861, by an act of parliament, high courts of judicature were established at each presidency and in the North-west Provinces, under the control of a chief-justice, and as many other judges, not exceeding fifteen, as her majesty may appoint. In 1871–72, there were 1,088,153 civil suits in India, and there can be no doubt that the machinery for litigation supplied by the courts is much employed. Sir G. Campbell, however, fears that the tendency to uphold the bare doctrines of law—the literal fulfillment of contracts alleged to have been entered into by ignorant and improvident people—leads to great hardship in cases which affect poor men and benefit the rich and litigious. The civil procedure code of India offers facilities for litigation which are apt to be abused. Sir George Campbell, in illustration of the views entertained of legal proceedings by some classes of Indian litigants, gives the following account of a litigation between the members of a family originally belonging to one of the hill-tribes. One of the parties, after litigating through all the courts of India, got a decree in the highest court. But there was an appeal to the privy council, and the suitor's funds were exhausted. So they caught an old man, carried him to the top of a hill, and sacrificed him to propitiate the gods who rule the decisions of the privy council. The civil procedure code worked such mischief among the Sontals, that the people were exasperated, and had to be removed from the operation of laws applicable generally in Bengal.

Revenue, Expenditure, etc.—The annexed table shows the gross amount of the public revenue and expenditure of British India, with the surplus or deficiency of revenue in each of the under-mentioned years:

Years ended.	Gross Revenue.	Total Expenditure.		Gross Expenditure.		Surplus (+) or Deficiency (−) of Revenue.	
		In India.	In England.	Exclusive of Public Works Extraordinary.	Including Public Works Extraordinary.	Exclusive of Public Works Extraordinary.	Including Public Works Extraordinary.
1869....	49,262,691	43,225,587	10,181,747	52,036,721	53,407,334	−2,774,030	−4,144,643
1870 ...	50,901,081	42,791,013	10,591,013	50,782,412	53,382,026	+ 118,669	−2,480,945
1871 ...	51,413,686	41,015,502	10,083,004	49,930,696	51,098,506	+1,482,990	+ 315,180
1872....	50,110,215	40,486,818	8,127,694	46,986,038	48,614,512	+3,124,177	+1,495,703

The gross amount of the public revenue and expenditure in each province in British India, exclusive of receipts and expenditure in England, for the year ending Mar. 31, 1875, is shown below:

	Revenue.	Expenditure.
India under the governor-general	£2,568,299	£13,447,250
Bengal	15,087,294	8,057,769
North-west Provinces	5,879,317	2,202,025
Oude	1,587,004	575,648
Punjab	3,747,682	1,747,472
Central Provinces	956,212	693,883
British Burmah	1,488,148	771,218
Assam	552,001	361,290
Madras	8,873,826	5,897,554
Bombay (including Sinde)	9,986,805	7,006,474
Totals	£50,226,588	£40,760,583

The revenues and expenditure of the Eastern settlements, and of Hyderabad assigned districts, or the Berars, are separated from the revenues and expenditure of British India, and not included in the above statement. The total revenue of British India for 1878–79 was estimated at £63,195,000; the expenditure at £61,039,000. The chief items of the revenue are much in the same proportion year by year. In 1875 they were: land revenue, £21,037,912; opium, £8,324,879; salt, £6,150,662; stamps, £2,758,042; customs, £2,678,479; excise on spirits and drugs, £2,346,143. The land tax alone produces nearly the half of the whole revenue. In India the government has always been considered the owner of the soil, and the actual cultivators pay a rent or tax, in collecting which different systems have hitherto been followed in different parts of the country, known as the *Zemindari Settlement*, *Ryotwar*, and *Mouzawar* or *Village Settlement*. The latter is the oldest and the simplest system. Each village under this arrangement was regarded as a separate municipality, and each was assessed by the government at a particular sum, for the due payment of which the headman of the village was considered responsible. The individual distribution of the burden of taxation rested with the village authorities, and government, provided it received its regular dues through the *potail*, interfered no further. The origin of the Zemindari and Ryotwar settlements requires some explanation. When the English first entered upon the administration of the country, they found that the practice of native sovereigns, their predecessors, had been to farm out the land revenues of the country to the nobles of the court, or to wealthy bankers, who annually paid a fixed amount into the royal treasury, and collected the government dues on their own behalf, from the actual cultivators of the soil. These farmers of the revenue were termed Zemindars. The question for the English rulers arose, whether or not they were to consider these men as proprietors. In Bengal and Bahar they were so recognized, and confirmed in their position, the government holding them responsible for the payment of the dues on their estates, and regarding the cultivators on the farms as their tenants. This was lord Cornwallis's Zemindari settlement. In Madras and Bombay, the opposite course was pursued. Claims of the middlemen, or farmers of the revenue, to enjoy any proprietary rights were totally ignored; and under sir Thomas Monro, the ryotwar system was introduced, by which government makes a separate settlement with each individual cultivator or *ryot*, who is recognized as the virtual proprietor of the land, or tenant direct under government, so long as he pays the land-tax annually charged on his estate or farm. In 1871, under the administration of lord Mayo, there was created a new department of revenue, agriculture, and commerce. It has charge of all questions relating to land revenue and settlements, works of agricultural improvement, silks and fibers, forests, commerce, trade, and the industrial arts. It has also under its charge the collection of statistics, placed under another new department, the statistical survey of India, of which the director-general is Dr. Hunter. His book on Orissa (see below) was the first installment of the work done. A series of leading questions has been issued by the director-general, showing exactly what information is required from residents in the different districts. A connected account of each district will be prepared from the returns, and these will be in turn condensed by the director-general into an imperial statistical account of India. "This survey," says Mr. Markham, "forms an epoch in statistical enterprises, and its practical results will be most important."

Currency.—In British India, accounts are kept in rupees, annas, and pie—16 annas going to the rupee, and 12 pie to the anna. The coins are rupees (value 2s. sterling), and half and quarter and half-quarter rupees, in silver; and in copper $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, of an anna. The currency of India, however, is chiefly silver, of which a large amount is coined annually. The coinage bears the impress of queen Victoria as empress of India, in the native costume. In 1861 an act was passed by the government of India providing for the issue of a paper currency by means of promissory notes. The amount of notes in circulation in 1877 was £11,641,654.

The public debt of India in India and England in 1872 amounted to £112,314,760, on which the interest paid was £533,329. In 1877 the total amount of the debt was

£127,320,159, of which £71,923,126 had been taken up in India, and £55,397,033 in England.

Commerce.—In 1875–76, 6,259 vessels, of 2,629,923 tons, entered Indian ports in the foreign trade; and 6,201, of 799,063 tons, cleared. The great bulk of the export and import trade of India is with Great Britain and Ireland; the following table shows the Indian imports from the United Kingdom, and its exports thither.

Year ended March 31.	Total Imports.	Total Exports.
1873	£36,431,210	£56,540,042
1874	39,628,562	56,940,073
1875	44,363,134	57,984,539
1876	44,188,062	60,291,731
1877	48,876,751	65,043,789

The total value of the merchandise imported into British India in 1872 was £31,083,747; of treasure, £11,573,813. The chief items were: coal and coke, £514,794; cotton manufactures, £17,484,887; metals of all kinds, manufactured and unmanufactured, £2,390,775; salt, £913,975; raw silk, £651,595; silk manufactures, £480,948; spirits, £560,485; sugar and saccharine matter, £709,779. The total value of the exports in 1872 was as follows: Indian produce or manufactures, £61,697,225; foreign merchandise, £1,488,622; treasure, £1,476,093. The chief exports in the same year were the following: Coffee, £1,380,410; cotton wool, £21,272,430; cotton, manufactures of, £1,191,683; dyes of all kinds, £3,956,869; grains and pulse, £4,865,748; hides and skins, £2,515,860; jute and manufacture of jute, £4,299,767; opium, £13,365,228; seeds, £2,728,127; silk, £1,130,706; tea, £1,482,186; wool, £906,698. In 1875–76, the value (including treasure) of the total imports was £44,188,062; of exports, £60,291,731. The greater part of the trade of India is carried on with Great Britain; but there is also an extensive commerce with Ceylon, the Straits settlements, China, Australia, the Persian gulf, the Red sea, and several of the European states.

Roads and Railways.—Since 1836 great trunk-roads have been constructed in various parts of India. The most remarkable is that from Calcutta to Peshawer, 1400 m. long. The importance of these great works has now diminished, owing to the extension of a great railway system in India. The chief railways now open are the East Indian, from Calcutta to Delhi; the Indian Peninsula, which forms a branch to Bombay; the Delhi, Punjab, and Sinde, which will ultimately connect the system with the mouth of the Indus; the Bombay and Baroda, which runs n. from Bombay; the Madras railway, running s.e. to Madras, and thence s.w. to Beypûr on the Coromandel coast. Up to March, 1876, £93,720,794 had been expended by the guaranteed railway companies, and £8,000,000 were required to complete their lines. The net receipts in 1875 were £3,647,868, including £71,354 from the state lines. If we estimate the capital at £97,000,000, this represents an average return of £3, 15s. per cent upon the five per cent guaranteed capital, and a net loss to the government of £1,242,107. As the railways, however, are now almost completed, it is expected that their financial position will soon improve. In 1876–77 the net loss to government was only £588,467. In 1877 there were in all 6,948 m. of railway open in India, and near 3,000 more in course of construction. Nearly 17,000 m. of telegraphs connect all the important cities of British India, this Indian system being connected by three lines with England.

Irrigation Works and Canals.—We have already referred to the importance of irrigation in India, and the great attention given to the subject within late years. Our space will not permit us even to enumerate the great works recently undertaken in the basins of the Indus, Ganges, Mahanaddy, and Tapti, and in other parts of India, to supply water to the rich but parched soil, and thus extend the area of cultivation. Several of the canals are adapted for navigation as well as irrigation—and when works now in progress in Sirhind have been completed, there will be navigable communication from the Ganges to the Sutlej, and down the Indus to Kurachee. To give the greatest possible efficiency to the action of the government in relation to the extension of canals, an inspector-general of irrigation works has been appointed, with irrigation secretaries in the various provinces.

Disease in India.—The climate and sanitary condition of India give rise to pestilences which at intervals carry desolation over the country, whilst disease in its worst form is never absent. Hospitals, richly endowed and admirably regulated, supported as well by government as by private munificence, exist in all the large towns; and great efforts are constantly made to bring the benefits of medical skill and knowledge within reach of the poorer classes. In all parts of the country dispensaries have been opened, where medicines are given out, and patients advised. Much of the disease of India is due to bad water and bad drainage; and where a new water-supply has been introduced, and drains have been made, as in Calcutta, the improvement in the health of the inhabitants has been marked. Nearly 2,000,000 of persons were vaccinated in India in 1872. Mortality is fearfully aggravated by the passion of the people for pilgrimages. All ages and sexes traverse vast areas, and die by hundreds on the route. The Mohammedan pilgrims go in numbers to Mecca, Kerbela, and Jerusalem; and a large proportion never return.

Emigration and Colonization.—From the table at the head of this article, it appears that the population of British India is very unequally distributed. While Bengal resem-

bles a city in the density of its population, the adjoining provinces of Assam and Burmah, although no less fertile, have a very small number of inhabitants. The recurrence of famines in this over-peopled district shows the importance of encouraging emigration. The tea-planters are now attracting large crowds into Assam and other districts. In 1871 the number despatched was 7,022 against 4,863 in 1870, and the number is increasing. In Burmah there were 97,679 coolie immigrants in 1871–72. The distant emigration from India has become very important in recent years, and to regulate it the Indian emigration act (vii. of 1871) was passed, consolidating all previous laws for the protection of the emigrant coolies. One condition with respect to emigration from India to the British colonies is that there shall be 40 women to every 100 men. In 1871–72 the number of emigrants who left Calcutta for the West Indies was 8,231, and the condition as to the proportion of the sexes was fully complied with. In the same year 3,383 returned to Calcutta. As a rule, the Indian emigrants improve their condition by service in the West Indies. It is thought that, except to a few limited districts, colonization from England must ever be impracticable in India on account of the unfavorable character of the climate; for the European race settled in the country rapidly degenerates, and in a few generations becomes effete, and bodily and mentally enervated. A constant stream of British capital, however, and fresh directing energies in its application, is the great want, and what would secure, as nothing else can, the development of its unlimited resources. Indigo and sugar factories, and coffee and tea plantations, have been the principal undertakings in which independent British capital and energy have been hitherto embarked, and the results have been most satisfactory.

Christianity in India.—India was one of the earliest fields of Christian missions. Tradition assigns it as the scene of the apostle Thomas's labors and martyrdom. Whether this was the case or not, we find a Syrian church planted in Malabar in southern India, which undoubtedly had a very early origin. The Jesuit missionaries, from the middle of the 16th c. onwards, had a large success in India. See XAVIER, FRANCIS. The Catholic missions now confine their attention to their Christian converts. They are divided into two branches—the Portuguese or Goa branch, and the Jesuit mission. The number of the former in Bombay is not known; they number elsewhere 48,000. The Jesuit converts exceed half a million in Madras, Pondicherry, and Travancore. The earliest Protestant missionaries in India came from Holland and Denmark. With the latter mission the eminent Schwartz was connected. England's first missionary effort was put forward by the society for the propagation of the Gospel, and the Christian knowledge society, which commenced in the beginning of the 18th c., by aiding the Danish mission already established in southern India. Subsequently, the East India company adopted the policy of excluding missionaries altogether from their territories; but since the beginning of this century, when these restrictions were withdrawn, a great work has been entered on, in which all denominations are represented. In Bengal 16,000 ryots profess Protestantism. In Chota Nagpore, within the last 20 years, German missionaries have converted 20,000 Kols. In Oude and Rohilcund there are 2,000 converts. In southern India the numbers are much greater. The entire number of Indian Protestants in India in 1852 was 128,000; in 1862, 213,182; and in 1872, 318,363. Mr. Markham, who gives these figures in his report for 1873, speaking of the Protestant missions, says: "The government of India cannot but acknowledge the obligations under which it is laid by these 600 missionaries, whose blameless example and self-denying labors are infusing new vigor into the stereotyped life of the great population placed under English rule, and are preparing them to be in every way better men and better citizens of the great empire in which they dwell." In the proclamation to the princes, chiefs, and people of India, read in the principal cities, on Nov. 1, 1858, it was declared "that none shall be in anywise favored, none molested or disquieted, by reason of their religious faith and observances, but that all shall alike enjoy the equal and impartial protection of the law." The fullest toleration in matters of faith is enjoyed throughout British India. Fanaticism only, as when it seeks to enforce the burning of widows or suttee (q.v.), or offers human beings in sacrifice, is curbed by the ruling power. There is no exclusively endowed state-church, but government continues to pay the state grants made to Hindu temples and to Mohammedan mosques. Clergymen of the church of England, the church of Scotland, and the Roman Catholic church, are retained on the government establishment as civil or military chaplains. There are church of England bishops at Calcutta, Madras, and Bombay.

Education.—The education of the people of India is based on the system set forth in a dispatch of sir Charles Wood, dated July 19, 1854. The main principle of the dispatch was that European knowledge should be diffused through the languages understood by the great mass of the people; but that the teaching of English should always be combined with careful attention to the study of the vernacular languages. With regard to the wealthier classes, it was declared that the time had arrived for the establishment of universities in India, conferring degrees, and based on the model of the university of London. They were not to be places of education, but to test the value of education obtained elsewhere, and to confer degrees in arts, law, medicine, and civil engineering. Such universities have accordingly been established in Calcutta, Madras, and Bombay; and since 1859 government schools have been opened for the instruction of all classes of the Indian people. In each province there is now a director of public instruction,

assisted by school inspectors, one of whom has under his care one circle or subdivision of the province. Normal schools for the training of teachers have also been established, and attempts are being made to spread female education. In 1874–75 there were 53,764 government and private schools and colleges, giving instruction to 1,668,026 pupils, the gross expenditure on government schools from imperial and other sources being upwards of £1,000,000. In the North-west Provinces the total number of pupils under instruction is about 220,000. There are 250 boys in every 3,000 people, and of these 16 are at government schools, 14 at vernacular schools, and 2 learn English. In the same 3,000 people there are 200 girls, and 1 is at school. In 1875–6, 838 candidates passed the entrance examination at the university of Calcutta, 662 at Madras, and 431 at Bombay. The postal statistics partly illustrate native progress. The number of letters and newspapers carried by the post more than doubled in the ten years 1867–76. The total number of letters, etc., sent through the post-offices of British India in 1875–6 was 119,470,921.

Administrative Divisions.—The *Lower Provinces of Bengal*, under their lieutenant-governor. Bengal in this sense includes the provinces of Bengal, Bahar, Chota Nagpore, and Orissa. Calcutta is the seat of government. *Assam* was detached from Bengal, and made a separate government under its own chief commissioner, in 1874. For sanitary reasons the seat of government is not now at Gowhatty, but at Debrugurh. The *North-west Provinces*, under their lieutenant-governor, formerly under the same administration as the Lower Provinces of Bengal, constitute a distinct government, the capital being Allahabad. *Oude* (or *Audh*) is another local government, its head being styled chief commissioner. The seat of government is Lucknow. The *Punjab* is administered by a lieutenant-governor; its capital is Lahore. The *Central Provinces* became a separate chief commissionership in 1861; Nagpore is the chief town and seat of government. In *British Burmah*, the three provinces of Aracan, Pegu, and Tenasserim form the administration of a chief commissioner. The territories *immediately under the administration of the governor-general* are Ajmere and Mairwara, Coorg, Berar, and Mysore. Most of the preceding administrations lie within the limits of what used to be known as the presidency of Bengal. The other two "presidencies" have not much changed their areas. *Madras*, with its capital of the same name, has an official head called governor. *Bombay*, named after the seat of government, has also a "governor." It should be added that as the threefold division into presidencies is maintained for military purposes, the army of Bengal is responsible for the territory not included in Madras or Bombay, save that Mysore is garrisoned by the Madras army.

History.—The oldest history of India is entirely legendary; it is shrouded in mythical narratives, which, though of the highest interest from a religious and archæological point of view, do not enlighten us as to the dates of the personages concerned, nor as to the *reality* of the facts which they record. Thus, the solar and lunar dynasties spoken of in the epic poems, the *Rámáyana* and *Mahábhárata*, and in the *Puránas*, as well as other dynasties, like that of Pradyota, S'isunâga, and others mentioned in the *Puránas*, are for the present, at least, beyond the reach of history, in the sense in which we use this word. The first reliable date to be met with in ancient Hindu history is that of *Chandragupta;* for he is the king whom the Greek historians call *Sandrocottus;* and as he was the ally of Seleucus, we may safely conclude that he reigned about 300 B.C. He belonged to the Manrya dynasty, which contains another distinguished name, that of the king *Asôka*, who plays a prominent part in Buddhist history, and probably reigned from 263 to 226 B.C.; but since the history of this and other dynasties which reigned in different parts of India up to the time of the Mohammedan conquest concerns more the special student of Hindu antiquity and Indian history than the general reader, we must content ourselves here with referring those who take an interest in it to the admirable work of prof. Christian Lassen, the *Indische Alterthumskunde*, where they will not only find the richest material collected in any one book hitherto devoted to this subject, but also learn to appreciate the difficulties which beset the questions of ancient Hindu history and chronology.

From the Mohammedan Conquest (1001) *to the close of Viscount Canning's Administration* (1862).—*House of Ghizni* (1001–1167). The sultan Mahmûd, sovereign of the small state of Ghizni (q.v.), was the first conqueror who permanently established the Mohammedan power in India. In 1186 the house of Ghizni became extinct, and the Hindu princes fell one by one before a succession of Mohammedan dynasties, whose names and dates are as follows: *Slave kings of Delhi* (1206–1288).—One of these sovereigns, Altmish, who ascended the throne in 1211, added the greater part of Hindustan proper to his dominions, and in his reign the Mongol Genghis Khan devastated the north-eastern parts of India. In Balin's reign (about 1284) the Mongols made a second irruption into Hindustan, but were totally defeated by the monarch's eldest son, the heroic Mohammed, who fell in the action. The *Khiljis and House of Toghlak* (1288–1412).—In 1290 the Mongols made their third and last great irruption into Hindustan, but were almost annihilated by Zafir Khan, whose name became so proverbial among the Mongols, that when their horses started, they would ask them if they saw the ghost of Zafir Khan. In 1397, during the reign of the last of the Toghlak kings, the Tartar Timur, or Tamerlane, sacked Delhi, and proclaimed himself emperor of India. *The Syuds* (1412–1450). *The House of Lodi* (1450–1526). To the kings of this dynasty succeeded the *Great*

Moguls or House of Timur (1526–1707). Baber, who had for 22 years been sovereign of Cabul, invaded India for the fifth time towards the end of the year 1525 (see BABER), and after doing battle with sultan Ibrahim on the plain of Paniput, April, 1526, entered Delhi in triumph, and established himself as emperor of the Mohammedan dominions in India, in right of his ancestor Timur. He died in 1530, and was succeeded by his son Humayun. The celebrated Akbar (q.v.), son of Humayun, became emperor in 1556, and reigned for nearly 25 years. His son ascended the throne in 1605, and his grandson, Shah Jehan, in 1627. In 1658 Shah Jehan was imprisoned by his son, the famous Aurungzebe (q.v.), who usurped the imperial power. This remarkable man raised the Mogul empire to the highest pitch of greatness and splendor, and was the ablest and most powerful, as well as the most ambitious and bigoted, of his race. The death of Aurungzebe took place in 1707, and the decay of the empire, which had begun a few years before then, proceeded rapidly. "A succession of nominal sovereigns, sunk in indolence and debauchery, sauntered away life in secluded palaces." Viceroys of the Great Mogul formed their provinces into independent states; whilst Hindu and Mohammedan adventurers carved out kingdoms with the sword. The dismemberment of the Mogul empire opened a wide field for ambition and enterprise to the nations of Europe. The Venetians, the Genoese, the Portuguese, and the Dutch had by turns traded with India; and in 1602 the English appeared on the scene. See EAST INDIA COMPANY.

In 1653 Madras was raised into a presidency, and in 1668 the island of Bombay—which was the dowry of Charles II.'s queen, the Infanta Catherine of Portugal—was transferred by the crown to the company. The invasion of the Persian, Nadir Shah, in 1738, who sacked Delhi, slaughtered its inhabitants, and carried away the peacock throne, and vast treasure, hastened the fall of the Mogul empire.

1745–1761.—Great jealousy existed between the English and French, who had also established themselves in India. On the declaration of war between England and France, hostilities commenced in the Madras presidency, nor were they terminated by the peace of Aix-la-Chapelle, in 1748. The struggle in the Carnatic was continued with ardor, under pretext of supporting the claims of rival native princes to sovereignty. Clive (q.v.), the first and most famous name on that great muster-roll of British soldiers and statesmen who have thrown such luster on the British occupation of India, laid the foundation of his country's supremacy in the east. His memorable defense of Arcot in 1751, and his subsequent victories, broke the spell of French invincibility. The next memorable event was the siege and capture of Calcutta, on June 20, 1756, by Suraja Dowlah, grandson of Ali Verdi Khan, and governor or subahdar of Bengal. The prisoners, 146 in number, were confined in the small garrison prison or Black Hole, of whom only 23 survived till the morning. Clive quickly took command of an expedition fitted out at Madras, recovered Calcutta (1757), and, assisted by admiral Watson, prosecuted the war with his usual vigor, till after a hollow peace and a renewal of hostilities, Suraja Dowlah was completely defeated by Clive in the memorable battle of Plassey, June 23, 1757. Meer Jaffir, Suraja Dowlah's commander-in-chief, was placed on the musnud by the English, who from this time ruled Bengal as well as Bahar and Orissa.

Political Progress of East India Company (1764–1773).—After the battle of Buxar, fought in 1764 with Sujah Dowlah, the usurping vizier of Oude, the Mogul emperor, Shah Alum, who had previously been in the power of the defeated Sujah Dowlah, claimed the protection of the British. He confirmed the company in their possessions, and granted them the collectorate or perpetual *dewannee* of Bengal, Bahar, and Orissa, on condition of receiving the sum of £260,000 per annum. During the subsequent financial difficulties of the company, they repudiated this and other conditions which they had guaranteed to Shah Alum; and the cost to the company of maintaining their authority and standing army prevented them from undertaking public works and developing the resources of the country. The regulating act was passed in 1773, and a governor-general was appointed. In 1765 Clive purged the Indian government of oppression, extortion, and corruption, and from that, his last visit, dates the purity of the administration of our eastern empire.

Administration of Warren Hastings (1773–85).—Warren Hastings was the first governor-general of India. A new power, the supreme court of judicature, appointed by the regulating act, came into operation during his administration. This council arrogated to itself authority exceedingly embarrassing to the governor-general, to whom it was very hostile. Hastings used very unscrupulous, and at times very unjustifiable means to replenish the East India company's exchequer, but, by his energy and talent, he averted dangers that threatened to annihilate the British supremacy in India. The powerful Mussulman sovereigns, Hyder Ali and the nizam of the Deccan, assisted by French officers, combined with the Mahrattas against the English; sir Eyre Coote broke up the confederacy, and defeated Hyder Ali in 1781. In 1782 the supreme court of judicature was deprived of its independent powers, and the policy of Hastings was successful both in the council and in the field. In 1784 Mr. Pitt instituted the board of control.

Marquis Cornwallis (1786–93).—Lord Cornwallis, who succeeded Warren Hastings, was both governor-general and commander-in-chief. His administrative measures were important, and consisted most notably in fixing the land-rent throughout Bengal on that

system of land tenure known as Zemindari, and reforming the judicial system. In 1790 lord Cornwallis, with the nizam, the Mahrattas, and the rajah of Coorg for allies, made war on Tippoo, sultan of Mysore, who had invaded Travancore, then under British protection. Terms were dictated to Tippoo at his capital, Seringapatam, and he was compelled to cede half his dominions to the company.—The marquis Cornwallis was succeeded by sir John Shore (1793–98), whose rule was in no respect memorable.

Marquis Wellesley (1798–1805).—The British empire in the east, like that of Napoleon I. in Europe, could only be maintained by constant fighting; it was the price paid for empire, and to stand still was to retrograde. Tippoo Sahib broke his faith by intriguing against the English both with the French and with native princes: his bad faith cost him his crown and his life. In May, 1799, Seringapatam was captured, and Tippoo slain. The Hindu dynasty, displaced by Hyder Ali, was restored, and the administration carried on most successfully for the youthful rajah by col. Wellesley (afterwards duke of Wellington). In the famous battle of Assaye, in 1803, he defeated the Mahrattas under Scindia; and the victories of lord Lake in northern India extended very considerably the dominions of the company. The policy of the marquis Wellesley was, however, too aggressive to suit the views of the East India company, and he was superseded by lord Cornwallis, who only returned to India to die. Lord Minto succeeded from 1806 to 1813.

Nothing of much importance occurred until the marquis of Hastings became governor-general (1813–23). He waged war against the Pindaris, who were entirely suppressed. He had previously defeated the Gurkhas; and before the close of his brilliant administration, he made the British power supreme in India. The civil administration of the marquis of Hastings was directed to the amelioration of the moral condition of the people of India.

The next administrations were those of earl Amherst and lord William Bentinck. The first was signalized by the Burmese war, the second by the suppression of sutti and the thugs.

Earl of Auckland (1835–42).—This governor-general is known chiefly by his unjustifiable and disastrous Afghan policy, ending in the horrible massacre of British troops in the Khyber pass. See AFGHANISTAN.

Earl of Ellenborough (1842–44).—The "army of retribution" proceeded to Cabul soon after lord Ellenborough took the reins of government. Cabul was sacked, several public buildings razed to the ground, after which the country was evacuated. The conquest of Sinde by sir Charles Napier, followed by its annexation, also belongs to this administration.

Sir Henry Hardinge (1844–48).—Lord Ellenborough having been recalled by the East India directors, from alarm at his martial tendencies, sir Henry Hardinge was sent to take his place. The attention of the new governor-general was, however, soon diverted from works of peace, to do battle with the bravest people of India. Ever since the death of our ally, Runjeet Singh, in 1839, the Punjab had been in a state of disorganization. The Sikhs, uneasy at our conquests in Sinde and Gwalior, and remembering our discomfiture at Cabul and the Khyber, resolved to anticipate the attack they considered imminent. The first Sikh war commenced on the part of the Punjabees by the passage of the Sutlej, and was followed by the terrible battles of Moodkee, Ferozeshah, Aliwal, and Sobraon, in which, after very hard fighting, the Sikhs were defeated with great slaughter. The war resulted in a British resident and British troops being stationed at Lahore, although the boy-prince, Dhuleep Singh, was acknowledged as maharajah. The Cis-Sutlej states, the Jullundur Doab, and the alpine region between the Beas and the Sutlej, were annexed.

Marquis of Dalhousie (1848–55).—The administration of the marquis of Dalhousie is memorable for the commencement of superb public works, cheap uniform postage, railways, telegraphs, improvements in government, and social progress generally; a second Sikh war (ending in the crowning victory of Gujerat, Feb. 21, 1849), a second Burman war (finished in 1852); and the annexation of four kingdoms, the Punjab, Pegu, Nagpûr, and Oude.

Viscount Canning (1856–62).—When lord Canning took the reins of government, everything promised a reign of peace and prosperity. With the early days of 1857 came the first mutterings of the storm that was to sweep over so large a portion of British India. At the commencement of the year, chupattees (cakes of flour and water) were circulated mysteriously through the North-west Provinces; treasonable placards appeared at Delhi, and other suspicious occurrences gave warning of Mohammedan disaffection or conspiracy. The Enfield rifle and its greased cartridge was at this time put into the hands of the sepoys without explanation or precaution; and gen. Anson, the commander-in-chief, snubbed caste, and was against all concession to the "beastly prejudices" of the natives. The mutiny broke out at Meerut (32 m. from Delhi), where there were stationed European troops amounting to about 1800 men, besides sappers and miners, and about 2,900 native soldiers. On April 23 the skirmishers of the 3d native cavalry, on parade, refused to touch the new cartridges, although permission was given to break off the end with the fingers. The 85 mutineers were tried, and sentenced to imprisonment. On the evening of the next day, the native troops rose, liberated

their comrades and the felons of the jail, shot down their officers, and the doomed station was given up to conflagration and massacre. The next day, May 11, the Meerut mutineers reached Delhi. There were no European troops to oppose them, and the city fell into their hands, but was retaken by gen. Archdale Wilson the following Sept. Nana Sahib of Bithoor, whose claims as the adopted son of the pishwah had not been recognized by the British government, fanned the insurrection. At the end of June gen. Wheeler was forced to surrender to him at Cawnpore, and, in spite of the promise of safe-conduct to Allahabad, all the men were immediately massacred. The women were butchered on July 15, by order of the nana, when he heard of Havelock's march from Allahabad, which began on the 7th of the same month. The Europeans in the residency at Lucknow were besieged on June 30th. Five days afterwards, the commandant, sir Henry Lawrence, died of his wounds, and his place was taken by brig. Inglis, who bravely held out till he was relieved on Sept. 25 by the heroic Havelock. The final relief was achieved by sir Colin Campbell; and on the 17th the city was again in complete possession of the British. By June, 1858, no city or fortress of any importance remained in the hands of the mutineers. Oude was entirely reduced by the beginning of the year 1859. The able rebel leader, Tantia Topee, a Mahratta Brahman, was taken, tried by court-martial, and hanged. During the mutiny valuable assistance and protection were received from many native chiefs. Honors were, in consequence, bestowed upon Scindia, the maharajah of Gwalior; Holkar, maharajah of Indore; the nizam, and others. The trial of the king of Delhi resulted in his conviction as "a false traitor to the British government, and an accessory to the massacre in the palace." It was the fate of the last representative of the East India company to sentence the last Great Mogul and heir of the house of Timûr "to be transported across the seas as a felon." He was transported accordingly, accompanied by his queen and son, to Tongu, in Pegu, where he died in 1862.

The transfer of the government of India to the British crown, and the new constitution already referred to, were the immediate consequences of the mutiny.

The Earl of Elgin (1862–63).—No event of importance occurred during the brief administration of governor-general lord Elgin, who died in Nov., 1863.

Sir John Lawrence (1863–65).—Towards the close of lord Elgin's administration, a Mohammedan rising was apprehended in n.w. India, and it was considered most desirable that the new viceroy should have practical experience of Indian affairs. Sir John, afterwards lord Lawrence, was accordingly appointed viceroy. He conducted the government with prudence and zeal; but unfortunate events occurred during his term of office. A war with Bhotan terminated rather unsatisfactorily for England in 1865; and a dreadful famine occurred in Orissa, caused by a drought and failure of the crops, by which 1,500,000 people perished.

Earl Mayo (1869–72).—The administration of lord Mayo was inaugurated by a great demonstration at Umballa on March 27, 1869, when the ameer of Afghanistan was received in state, and received a supply of arms and the first installment of a money subsidy of £120,000 a year. In returning from Rangoon to Calcutta, lord Mayo visited a convict establishment in the Andaman islands, and was assassinated there by one of the prisoners in Feb., 1872. The act had no political significance.

Baron Northbrook (1872).—Lord Northbrook entered on office in May, 1872. The chief events of his administration were "the Bengal famine," which, however, was anticipated in good time; and the visit of the prince of Wales to India (1875).

Baron Lytton (1876).—The most important events in the tenure of office of lord Lytton have been the proclamation of the queen as empress of India (1877), the relief of another famine, and the Afghan war (1878–79).

For information on India, consult: *The History of British India*, by James Mill, with notes and continuation by Horace Hayman Wilson, M.A., F.R.S. (Lond. 1858); *The Indian Empire*, by R. Montgomery Martin (Lond. 1862); *The History of the Indian Revolt*, published by the Messrs. Chambers in 1859; *An Account of the Mutinies in Oude and of the Siege of the Lucknow Residency*, etc., by Martin Richard Gubbins (Lond. 1858); *The Marquis of Dalhousie's Administration of British India*, by Edwin Arnold, M.A. (Lond. 1862); Watson and Kaye's *People of India* (Lond. 1866–70); *Geography of India*, by George Duncan (Madras, 1870); Kaye's *Sepoy War* (1871); Hunter's *Orissa*, and other works on India (Lond. 1872–74); Markham's *Official Report exhibiting the Moral and Material Progress of India during* 1871–72 (printed 1873); *Geography of India*, by J. Hill (Lond. 1824); *History of India*, by sir H. M. Elliot (Lond. 1872); *The Highlands of Central India*, by capt. J. Forsyth (Lond. 1871); *La Langue et la Littérature Hindoustanie en* 1871, by M. Garcin de Tassy (Paris, 1874).

INDIA, THE NATIVE STATES OF, are divided into those which are entirely independent and those which are more or less under the control of the Indian government. To the former class belong Nepaul (q.v.) and Bhotan (q.v.) To the latter class belong a large number of states, an estimate of the area and population of which is given in the following table:

Native States under the	Area in Sq. Miles.	Population.
Governor-general of India	304,448	26,758,178
Lieutenant-governor of Bengal	38,936	2,271,943
" " N.W. Provinces	6,311	1,091,810
" " Punjab	115,287	5,567,478
Chief Commissioner of Central Provinces	28,834	1,049,710
Governor of Madras	23,200	4,756,235
" Bombay	72,209	8,840,163
Total	589,315	50,325,457

The native princes who profess the Hindu religion are called rajahs and maharajahs; those who are Mohammedan are called nawabs, khans, etc. The following are a few of the most important more or less dependent native states: In the n.w. is Cashmere (with Ladakh), under a native rajah (pop. 3,000,000), a mountainous region of the western Himalaya; the hill states, under a large number of native chiefs (pop. 750,000); Gurhwal, under a rajah (pop. 200,000); Bawalpûr, under a khan, s. of Multan (pop. 1,000,000). The Sikh states, the largest of which is Puttiala (pop. 1,250,000), lie between the Jumna and the Sutlej. The Rajpoot states (pop. 8,500,000) number 18, each under a rajah. The states of Malwa are 21 in number: among the most important are Bhopal (pop. 815,000) and the Bundelcund states (pop. 1,142,000). Gwalior, or Scindia's dominions, includes a number of scattered districts (pop. 3,250,000), situated in the valleys of the Tapti, Nerbudda, and Chumbul. The present maharajah attained his majority in 1853, and was then intrusted with the administration. He has governed the country well, and, as stated above, in 1857 remained faithful to England. Indore, or the Holkar's dominions, lies between the Vindhya and Satpura mountains (pop. 815,000). Gugerat has a pop. of 4,250,000, and Cutch, 500,000; both countries are split up into a number of states. In the Deccan, Hyderabad has an area of 80,000 sq.m; the pop. is about 11,000,000. The country is ruled by the nizam or "regulator;" but sir Salar Jung, many years minister of the late nizam, has, during the minority of the present prince, acted as regent, and discharged the difficult duties intrusted to him with very great ability. Cochin has a population of 500,000, and Travancore of 1,000,000 Mysore (pop. 5,055,412) is a native state, but has long enjoyed the advantages of British rule: it is to be restored to native administration on the maharajah, who in 1874 was 11 years of age, reaching majority. He is under the care of an English tutor, the country being administered by an English commissioner. To these states are to be added those situated in the north-eastern provinces—viz., Sikkim, on the slope of the Himalayas, between Nepaul and Bhotan (pop. 62,000), governed by a rajah; Munipûr, between Assam and Burmah (pop. 75,000), under a rajah; and Independent or Hill Zipperah, a country covered with dense jungles, and inhabited by the Kookies, a savage race, whose chiefs pay tribute to a maharajah. No census of the native states having been taken, the estimates of population must be considered as mere approximations to the truth, on which no great reliance is to be placed.

Further information respecting many of the native states of India will be found under their respective names.

INDIA, FRENCH, comprises, at the present time, the following settlements:

Name.	Locality.	Area in Sq. Miles.	Population, in 1876.
Chandernagore	On the Hoogly river	200	270,500
Karikal	Coromandel coast		
Pondicherry	Coromandel coast		
Yanon	Orissa coast		
Mahé	Malabar coast		

INDIA, PORTUGUESE, is now confined to the territories indicated in the annexed table:

Name.	Locality.	Area in Sq. Miles.	Population.
Goa, etc	Western coast	1400	392,234
Damaun	Concan coast	42	53,283
Diu	South coast of Kattywar		

INDIANA, one of the United States of America, organized in 1816, with a governor and legislature, extends from 37° 47′ to 41° 46′ n. lat., and from 84° 49′ to 88° 2′ w. long., having a length of 275 m., a breadth of 135 m., and an area of 33,809 sq.m., or 21,637,760 acres. It is bounded on the n. by Michigan state and lake, e. by Ohio, s. by Kentucky, from which it is separated by the Ohio river, and w. by Illinois. The state is

divided into 92 counties. The capital is Indianapolis, near the center, and its chief towns are Evansville, New Albany, Madison, Richmond, Terre Haute, Lafayette, Fort Wayne, and its only lake port, Michigan City. The population in 1800 was 4,875; in 1810, 24,520; in 1820, 147,178; in 1830, 343,031; in 1840, 685,866; in 1850, 988,416; in 1860, 1,350,941 (of which nearly half were immigrants from other states, and from Germany and Ireland); and in 1870, 1,680,637. The state is level, with sluggish streams and great prairies. It is chiefly drained by the Wabash river and its branches. There are 7,700 sq.m. of coal, portions of which, on the Ohio, are cannel coal of excellent quality. The soil is of wonderful fertility, and the climate is like that of the s. of France, with colder winters, and the hills on the Ohio are covered with fine vineyards. The staple productions are wheat, maize, cattle, swine, tobacco, fruits, wine, etc. In 1869 mines of coal and iron were found, and also quarries of building-stone. There are over 4,000 m. of railway, and 374 m. of a canal uniting the Ohio river with lake Erie. There is a state university, a normal school, numerous common schools and churches, and about 300 periodicals. Vincennes, on the Wabash, was settled by the French in 1702. Early in this century the settlements were disturbed by Indian hostilities; the Indians were defeated in 1811 by gen. Harrison, and the territory was rapidly peopled.

INDIANA (*ante*), was a part of the territory claimed by the French previous to the cession of Canada to England in 1763. As early as 1702 emigrants from Canada made settlements at Vincennes, Corydon, and other places. They amalgamated with the Indians so far at least as to adopt many of their customs and habits. Soon after the country was transferred to the United States there were troubles with the Indian tribes, which caused great distress among the settlers at Vincennes. These troubles continued for several years, but a temporary peace was conquered by gen. Wayne. In May, 1800, Ohio was erected into a separate territory, while all the region w. and n. was included in the territory of Indiana, organized two months later, with William Henry Harrison as governor. Michigan and Illinois were subsequently organized, reducing Indiana to its present limits. After this the Indians again became troublesome, and the growth of the white settlements was impeded. The census of 1810, however, showed a population of 24,520. The national government, in 1811, determined to subdue the savages, and gov. Harrison was placed in command of a force of regulars and militia for that purpose. Tecumseh, a chief of the Shawnees, was the Indian leader—a man of unbounded influence with his people. Gen. Harrison marched to Tippecanoe on the Wabash, Nov. 16, 1811, and on the following day there was a desperate battle, in which the Indians were defeated, and not long afterwards they sued for peace. When the war with England broke out they rallied again, but were speedily conquered and nevermore troubled the settlers. Dec. 11, 1816, Indiana was admitted to the union, after which the growth of the state in population and wealth was very rapid. Its growth was still further accelerated a few years later by the construction of the national road and the Erie canal, which furnished new outlets for the produce of the west, and greatly diminished the terrors of the journey thither for emigrants from the east. In the ten years ending in 1830, 3,558,221 acres of the public lands were sold in Indiana, mostly to actual settlers. The population in the same time had increased to 343,031. Soon after this the state entered upon several great works of public improvement, by which it incurred a debt of more than $14,000,000, under which it sank into temporary bankruptcy in the financial revulsion of 1837. Notwithstanding this the population of the state doubled in the decade 1830–40 and 9,122,688 acres of public land were sold. It was not until 1846 that the state succeeded in making provision to meet the annual interest upon its debt. This brought prosperity; and since then its growth has been very rapid.

Indiana has no mountains, and fully two-thirds of its surface is level or undulating. The highest elevation is 540 ft. above the level of the Ohio at the mouth of the Wabash. The hills bordering the rivers inclose wooded bottom lands of the richest quality. Many of the hills on the Ohio are as high as the highest interior elevations. At the points where they are broken by tributary streams the scenery is quite picturesque. The table-lands of the interior are either vast level prairies, interspersed with groves of oak, ash, and other trees; or undulatory, with occasional hills rising from 100 ft. to 300 feet. Near the Ohio river some of the land is hilly or sterile, but mostly it is very productive. The principal river valleys are exceedingly fertile. The largest of these n. of the Ohio is that of the Wabash, containing 12,000 sq. miles. The next in size is that of White river, containing 9,000 sq. miles. The valley of the Maumee, in the n.e. part of the state, embraces an area of 2,000 sq. miles. Near lake Michigan on the n. the surface is broken into sand-hills, covered with stunted oaks and pines, but the land a few miles back from the shore is of a very fine quality. The principal streams which flow into the Ohio from Indiana are the Laughery, Indian, Kentucky, Silver, Indian Blue, Big Pigeon, and Little Pigeon, none of which are navigable. The Whitewater, in the e. part of the state, joins the Miami 6 m. above the point where the latter flows into the Ohio. The Wabash rises in Ohio, flows though the state for a distance of more than 500 m., and empties into the Ohio. It has been navigated about 300 m. from its mouth. Tributary to it are Salomonie, Mis-

sissinewa, Wildcat, Sugar or Rock, Raccoon, Patoka, Vermilion, Eel, Little, and White rivers, the latter having its source near the Ohio line. The Maumee is formed in Allen co., in the n.e. section of the state, by the junction of the St. Mary's from the s. and the St. Joseph's from the n., and flows in a n.e. direction through Ohio to lake Erie. The Kankakee, one of the constituents of the Illinois, flows a distance of 100 m. through the n.w. portion of the state. There is also another St. Joseph's in the n.w. part of the state, which rises in Michigan and returns to that state. Lakes and ponds are numerous in the state, most of them n. of the Wabash. Some of them have no outlets; their waters are clear and their shores and bottoms sandy. Beaver lake, near the Illinois line, which once covered an area of 10,000 acres, has mostly been drained off. Bituminous coal of three distinct varieties is found in the state in great abundance. The measures cover an area of nearly 6,500 sq.m. in the s.w. part of the state, extending from Warren co. on the n. to the Ohio river on the s., a distance of 150 miles. The total depth of the measures is from 600 to 800 ft., and they present from 12 to 14 distinct seams, the latter ranging from 1 ft. to 11 ft. in thickness. The celebrated block coal, which is used in its raw state for making pig-iron and is peculiarly suited to metallurgical purposes, is found in the s. zone of the coal measures. It is taken out of the mines in blocks weighing a ton or more. In Daviess co. there is a seam of superior cannel coal. Peat exists also in the n. part of the state; also bog-iron ore, suitable for mixing with the purer ores of Missouri. Quarries of building stone are estimated to cover an area of more than 200 sq. miles. The stone is of great variety in color and grade and of enduring strength. The product of the quarries in 1879 amounted to $500,000. Fire-clays exist also in great abundance. Salt springs are found on the e. border of the coal formation. In Crawford co., in the s. part of the state, is Wyandotte cave, which is only a less interesting phenomenon than the Mammoth cave of Kentucky. The climate of Indiana is marked by extremes and sudden changes. The winds in winter, sweeping over wide spaces without obstruction, are cold and piercing, but they temper the heats of summer. The mean temperature of the year is 52°, of the winter 31°, of spring 51°, of summer 76°, of autumn 55°. Only a small proportion of the land is unavailable for cultivation; one-third of the state is in forest, and one-eighth in prairie. The best lands are the bottoms on the Wabash, White, and Whitewater rivers. Among the forest trees are the oak, beech, sugar-maple, hickory, ash, black walnut, poplar, and sycamore.

As an agricultural state Indiana ranks high. The chief productions are wheat, corn, rye, oats, barley, buckwheat, peas, beans, potatoes, grass, clover-seed, fruit, flax-seed, flax, hemp, hay, tobacco, wool, hops, beef, bacon, pork in bulk, lard, butter, cheese, milk, maple-sugar, maple molasses, sorghum molasses, honey, wax, wine, cider, vinegar, horses, mules, asses, sheep, swine, milch cows, working oxen, and other cattle. Some of the products in 1873 are reported as follows: wheat, 22,149,527 bush.; corn, 81,185,485 bush.; barley, 11,434,628 bush.; fruit, 3,473,161 bush.; tobacco, 12,377,182 lbs.; wool, 2,228,437 lbs.; beef, 3,320,067 lbs.; bacon, 40,716,539 lbs.; pork in bulk, 40,716,539 lbs.; maple-sugar, 302,041 lbs.; wine, 827,480 gall.; cider, 1,097,019 gall.; horses, 514,438; sheep, 1,235,874; swine, 2,999,139; cattle, 1,211,246. The wheat crop of 1879 was estimated at 55,000,000 bushels. The census of 1870 reports the number of farms at 161,289; 55,614 of which contained from 20 to 50 acres each, 52,614 from 50 to 100 acres, 29,433 from 100 to 500 acres, and 1004 from 500 to 1000 acres, while 76 contained upwards of 1000 acres. The cash value of these farms was estimated to be $634,804,189; value of farming implements, $17,676,591; farm wages paid (with board), $9,675,348; total value of all farm productions, $122,914,302; value of orchard products, $2,858,086; home manufactures, $605,639; animals slaughtered and sold for slaughter, $30,246,962; forest products, $2,645,679; live stock, $83,776,762. Coal mined in 1873, 570,382 tons; lime made, 1,167,661 bushels.

Indiana has but one port, Michigan City, on lake Michigan, and no direct foreign commerce: its internal trade by means of its rivers, canals, and railroads, is of vast extent. Evansville, on the Ohio, is a port of delivery of the United States and a place of considerable business. In 1873 there were 3,544 m. of railway track in the state. The most important of the roads are the following: Louisville, New Albany, and Chicago, 288 m.; Ohio and Mississippi, 225; Evansville and Crawfordsville, 109; Fort Wayne, Muncie, and Cincinnati, 108; Indianapolis, Cincinnati, and Lafayette, 158; Indianapolis, Peru, and Chicago, 161; Indianapolis and Vincennes, 116; Jeffersonville, Madison, and Indianapolis, 110; Pittsburg, Fort Wayne, and Chicago, 156; Toledo, Wabash, and Western, 166. The longest canal in the United States is the Wabash and Erie, connecting the Maumee river at Toledo with Evansville on the Ohio. It is 467 m. long, and its course for 374 m. is in Indiana. The Whitewater canal extends from Lawrenceburg on the Ohio to Hagerstown, 75 miles. Neither of these canals is much used. There were in the state, in 1873, 6,943 m. of telegraph, the assessed value of which was $807,874.

The number of national banks in 1873 was 92, with a capital of $17,611,800, and an outstanding circulation of $14,536,015. There were in the state at the same date 125 insurance companies, the gross receipts of which for six months ending July 1, 1873, amounted to $1,169,413. The total valuation of real and personal property in the state in 1873 was $950,467,854. The state debt at the same date was $4,898,657.

The number of manufacturing establishments in 1870 was 11,847, employing 58,852 persons, of whom 54,412 were males above 16 years of age, and 2,272 females above 15; while 2,168, including both sexes, were below 16: capital invested in these establishments,

$52,052,425; wages paid in 1870, $18,366,780; value of products, $108,617,278. The chief branches of manufactures are agricultural implements, boots and shoes, carriages and wagons, railroad cars, clothing, flour, furniture, iron, leather, lumber, liquors, machinery, pork-packing, saddlery, woolen goods, tin, copper, and sheet-iron ware.

The legislature, which meets biennially, is composed of a senate of 50 members, elected for four years, and a house of representatives of 100 members, elected for two years. The governor and lieutenant-governor are elected for four years, the former having a salary of $8,000 a year. Members of the legislature are paid $8 per day during the session. The supreme court consists of five judges, elected by the people for a term of six years, and receiving an annual salary of $4,000 each. The circuit judges, 38 in number, are elected by the people for terms of six years, and receive salaries of $2,500 each. The law provides for a superior court of three judges, elected for a term of four years, in any county containing a city of 40,000 inhabitants. Marion co., containing Indianapolis, the state capital, is the only one to which this provision is applicable. Every male citizen of the age of 21 years, who has resided in the state six months, has the right to vote. Women are eligible to any office in the gift of the governor or the legislature. The divorce laws, which were formerly very elastic, are now more strict. Divorce is allowed for seven different causes, including cruel and inhuman treatment, habitual drunkenness, and failure of the husband for two years to make provision for the support of his family.

The principal public institutions supported wholly or partly by the state are the hospital for the insane, and the institutions for the deaf and dumb and the blind at Indianapolis; the house of refuge at Plainfield; the soldiers' home at Knightstown; the northern state-prison at Michigan City, and the southern state-prison at Jeffersonville; the reformatory institution for women and girls in Indianapolis; the normal school in Terre Haute; the state university at Bloomington; and the agricultural college at Lafayette. An act was passed in 1879 to provide for the organization and support of the feeble-minded.

The state board of education is composed of the governor, the superintendent of public instruction, the presidents of the state university and the normal school, and the school superintendents of the three largest cities in the state. The common schools are under the immediate supervision of the state and county superintendents, and the trustees of educational affairs in cities and towns. Instruction is afforded without charge for tuition to all persons between 6 and 21 years of age; separate schools being provided for negroes. The permanent common school fund of the state amounted in 1874 to $8,616,931, yielding an annual income of $189,455. Besides this there is an annual poll-tax and a property tax of 16 cents on the $100 for school purposes. The income from these sources, added to the interest on the permanent fund, swelled the amount of school revenues in 1873 to $2,276,569. The whole school population of the state in 1872 was estimated at 640,332; the number of pupils enrolled was 465,154, of whom 13,895 were in high schools; average attendance, 298,851; number of teachers employed, of whom a majority were males, 12,056; total valuation of school property in 1872, $9,199,480. In 1879 the school population of the state was 707,845; average daily attendance, 312,143; number of teachers, 13,490; total school revenue, $4,902,163; value of permanent school property, $12,000,000. Besides the state university and the agricultural college, there are 16 institutions of learning that have no connection with the state. The most important of these are the university of Notre Dame (Roman Catholic), the North-western Christian university (Disciples), Asbury university (Methodist), Earlham college (Friends), Wabash college (Presbyterian). St. Mary's academy at Notre Dame, Logansport female college, De Pauw college at New Albany, and the Indianapolis institute afford superior instruction for girls. The total number of educational institutions in the state in 1870 was 9,073, with 11,652 teachers, of whom 4,974 were females; and 464,477 pupils. The number of libraries in 1870 was 5,301, containing 1,125,553 volumes. The most important of these are the state library at Indianapolis, and the libraries of Wabash college, Notre Dame university, Hanover college, State university, and the North-western Christian university. According to the census of 1870 there were in the state 293 newspapers and periodicals, with an aggregate circulation of 363,542 copies. Of these publications 20 were daily, 3 tri-weekly, 1 semi-weekly, and 233 weekly, 6 semi-monthly, 2 monthly, and 2 bi-monthly. The religious organizations at the same time numbered 3,698; the church edifices 3,106; value of church property, $11,942,227. The principal religious denominations were the Baptist, Christian, Congregational, Episcopal, Friends, Lutheran, Methodist, Presbyterian, Reformed (Dutch, and German), Roman Catholic, United Brethren in Christ, and Universalist.

The electoral votes of Indiana for president and vice-president have been cast as follows:—1816, 3 for Monroe and Tompkins; 1820, 3 for Monroe and Tompkins; 1824, 5 for Jackson and Calhoun; 1828, 5 for Jackson and Calhoun; 1832, 9 for Jackson and Van Buren; 1836, 9 for Harrison and Granger; 1840, 9 for Harrison and Tyler; 1844, 12 for Polk and Dallas; 1848, 12 for Cass and Butler; 1852, 13 for Pierce and King; 1856, 13 for Buchanan and Breckinridge; 1860, 13 for Lincoln and Hamlin; 1864, 12 for Lincoln and Johnson; 1868, 13 for Grant and Colfax; 1872, 15 for Grant and Wilson; 1876, 15 for Tilden and Hendricks; 1880, 15 for Garfield and Arthur.

INDIANA, a co. of w. central Pennsylvania, 770 sq.m.; pop. '70, 36,138. It is drained by the Mahoning, Black Lick, and Two Lick creeks. The surface is hilly and covered with forests, chiefly white pine. The soil is generally fertile. The staple products are

wheat, oats, buckwheat, maize, hay, and cattle. Mines of bituminous coal and iron ore, and salt-springs, are numerous. There are many manufactories, flour mills, tanneries, saw and planing mills. Cap., Indiana.

INDIANA ASBURY UNIVERSITY, at Greencastle, Putnam co., Ind., a Methodist institution, was organized in 1835. Number of instructors in 1878, 17; of students, 364. President, Alexander Martin, D.D., LL.D.

INDIANA'POLIS, a city and capital of Indiana, United States, is built on the w. fork of White river, near the center of the state, 100 m. n.w. of Cincinnati. It is a regularly built and beautiful city, with a handsome state-house, court-house, jail, and state asylums for the blind, deaf and dumb, and insane. It has a university, 2 female colleges, 64 churches, 8 banks, several printing-offices, hotels, woolen factories, iron-foundries, planing-mills, and flour-mills, with abundant water-power. It is the terminus of ten radiating railways. In 1840 the pop. was 2,692; in 1870, 48,244.

INDIANAPOLIS (*ante*), was selected in 1820 as the seat of government, and made the capital of the state in 1824. Pop. '80, 76,200. It is situated on a plain on the e. bank of the river. From a small park in the center four broad avenues diverge, intersecting the streets, which are very wide and run at right angles. The streets are generally graveled, but many are paved with stone or wood, and all lighted with gas. Nine bridges, all but one of iron, three of which are for railroad trains, cross the river here. The street railroads have 50 cars. There are 7 parks; that in the n. part of the city containing 100 acres. Thirteen railroads center here which, with their numerous branches, traverse the state, and connect its rich agricultural and mineral districts with the chief cities of the west. A belt-line around the city was commenced in 1875 for the purpose of connecting all the other lines. Eighty-two passenger trains, with over 300 cars, daily leave and enter the union depot, with an average of 10,000 persons, and the number of freight cars entering and leaving in 1874 was above 700,000. There are two large grain elevators, 10 flouring mills, and 8 pork-packing establishments. The manufactures of the city are varied and extensive, having 2 iron rolling mills, 20 foundries and machine-shops, car-works, factories for agricultural implements, sewing-machines, organs, pianos, carriages, household and school furniture, sash, blinds, glass, starch, glue, cotton and woolen goods, wooden ware, etc. The number of incorporated manufacturing institutions is 30, with an invested capital of $15,000,000. There is an efficient fire department, with 7 engines and a complete fire-alarm telegraph. The city is abundantly supplied with water by the Holly system. There are 6 national, several private, and 2 savings banks, many insurance companies, 70 churches, state asylums for the deaf and dumb, blind, and insane, a university, 2 medical colleges, a law school, a Roman Catholic theological seminary, a city hospital, an art school, an academy of music, a state library with 15,000 volumes, and a free city library with 14,500, a splendid court house, an exposition building, a chamber of commerce building, Odd Fellows' and Masonic halls, the union depot, U. S. arsenal, and many other fine massive buildings. A new state house; to cost $4,000,000, has been authorized by the legislature. The city has a well-organized system of public schools, containing over 20,000 pupils, a high school and a normal school. The public schools are supported from the state school fund of $8,000,000, and by state and local taxation.

The sales of real estate in 1873 amounted to $32,579,253. The taxable value of property in '73 was $65,000,000. The city was incorporated in 1836.

INDIAN ARCHIPELAGO. See MALAY ARCHIPELAGO, *ante*.

INDIAN ARCHITECTURE. The styles of art which have existed at different times in India, as in other countries, vary with the religion prevalent at the time. The earliest faith of which we have any architectural monuments is that of Buddhism (q.v.). About 250 B.C. Asoka, a powerful monarch, became a strenuous supporter and propagator of Buddhism, and to his zeal we owe the oldest architectural remains of India. From his time to the present day the sequence is unbroken, and the whole history of Buddhist architecture can be most distinctly traced either in India or in Ceylon, Java, and Thibet. The whole subject is as yet, however, but imperfectly illustrated, the best account of the Indian styles being that contained in Fergusson's *Handbook of Architecture*, and his other works.

The Buddhist remains are of two kinds: 1. Commemorative monuments, called stupas or topes (q.v.); the earliest stupas are single pillars, bearing evident traces of a western origin, and thus affording a clue to the history of Indian art. 2. Temples (chaityas) and monasteries (viharas). Of the chaityas and viharas no built examples remain; they are all excavated out of the solid rock. There are no less than 40 or 50 groups of these monuments, each group comprising from 10 to 100 distinct excavations. A few of these belong to other religions, but the great majority are Buddhist, and nearly the whole are monasteries, not over 20 to 30 being temples. The oldest are at Bahar and Cuttack in Bengal (200 B.C.), but they are few in number, nine-tenths of the caves being in the Bombay presidency. This probably arises from the nature of the material in which they are cut, the eastern caves being in a hard granite, and those of the west being in a very uniform and comparatively soft amygdaloid. The latter date from the beginning to to about the 10th c. of the Christian era. The cave-temple at Karli is one of the largest,

and is of a good style. (See section in art. BUDDHA.) In plan and general arrangements, it strongly, though no doubt accidentally, resembles a Christian basilica, with nave, aisles, and vaulted roof, and an apse with the shrine in the place of the altar. There is also an outer hall or atrium, and a gallery like the rood-loft. On the roof are numerous wooden ribs, attached to the vault; these and other portions indicate that the building from which the cave was copied was wooden, which may account for the absence of earlier built examples. This cave is 126 ft. long, 45 ft. 7 in. wide, and 40 to 45 ft. high.

The vihara or monastery caves are very numerous, as was required by the enormous number of Buddhist priests. The oldest and simplest examples are in Bengal, but the finest are in western India. They consist of a central hall, with cells round three sides, and a verandah on the fourth side, next the open air; opposite the central entrance there is usually a large cell or shrine, containing an image of Buddha. There are fine caves at Ajunta, Baugh, etc., many of them beautifully carved and painted. The pillars are most elaborately ornamented, and have the bracket capitals which distinguish all Indian architecture. From the absence of any built example, there has been great difficulty in forming a correct idea of the exterior of the buildings from which these caves were copied. By following the style into other countries where the religion has prevailed at different times, Mr. Fergusson has been able to trace it up to the present day, and to establish by analogy the probable external appearance of the early Buddhist architecture.

The temple of Brambanam, in Java, seems to show the original form of built cells. They are quite detached, and arranged in a square round a central temple—evidently suggesting the arrangement in the caves at Ajunta. Some rock-cut temples which have an exterior (at Mahavellipore), show the cells attached to the main building. In Burmah, where the monastic system still prevails, the monasteries, which are of wood, are built in stages in a pyramidal form. The temple of Boro Buddor (q.v.), in Java, has a similar arrangement, consisting of a large number of cells or niches in tiers; but in place of being occupied by priests, they are filled with cross-legged Buddhas, a conversion quite common in later Hindu architecture. In many styles of architecture the niches or other subordinate parts are frequently copies on a small scale of the façade of the building itself. Thus, for instance, the windows with pillars and pediments in classic architecture, are a repetition of a temple end. The niches inside the caves, containing statues of Buddhist saints, are in a similar manner imitations of the main façade. In the same way externally the Burmese pagodas and Hindu temples are ornamented all over with models of the buildings themselves.

Mr. Fergusson has thus traced, in fuller detail than our space will allow, the transformations that have taken place in Buddhist architecture, which, whatever its artistic qualities may be, has at least the very interesting feature of being a style which has existed from 200 years before Christ up to the present day.

The other styles of Indian architecture are illustrated by the temples of the Jainas and those of the Hindus. The former seems to have been an imitation of the Buddhist temples without the cells for the priests. Their religious structures consist of a sanctuary surmounted by a spire; in front of this a pillared vestibule, with a dome, and round the whole an arcaded inclosure, with cells all round, containing images. The cells are also surmounted with spires, and the arcades with domes are often repeated to a considerable number within one inclosure. The most striking feature of this style is the dome, which is constructed by horizontal jointing, not with regular arches. The domes, with the pillars, bracket capitals, etc., are all elaborately decorated.

Hindu architecture is divided into two styles—northern and southern. All the finest examples are southern, and are found s. of Madras. The temples consist of the temple or vimana, in front of which is the pillared porch or mantopa, the gate pyramids or gopuras, forming the entrances to the inclosure, and the pillared halls or choultries. In the s. the temple is always pyramidal, and in many stories; in the n. the outline is curved, and in one story. The finest example is the pagoda of Tanjore. It is 82 ft. sq. at base, and 14 stories, or about 200 ft., in height.

The gopuras are similar to the pagodas, but oblong in place of square.

The pillared halls are very wonderful structures, containing sometimes as many as 1000 columns, and as these are all elaborately carved, and all different, the labor of their construction must have been enormous. They are used for many purposes connected with Hinduism, their most important use being as nuptial halls, in which the mystic union of the divinities is celebrated. The general arrangement of these halls sometimes produces a good effect; but from their flat roofs they cannot equal the beauty of the domed arcades of the Jains. These buildings are of various dates, from the commencement of the Christian era to the last century, and it is remarkable that the oldest examples are the finest—the style growing gradually more and more debased, till, at the present day, it has become, like the religion, a mass of absurdity and obscenity. The celebrated rock-cut temple, called the Kylas, at Ellora (q.v.), belongs to this style.

When the Mohammedans conquered India they imitated the style of the country in their mosques, and afterwards the Hindus borrowed from them, and thus a mixed style was created, which, in the palaces, tombs, etc., of the native princes, produces picturesque effects. The Mohammedans also covered the country with specimens of their Moorish style, which will be treated under SARACENIC ARCHITECTURE.

Some of the finest buildings of India are the ghauts or landing-places, with their broad flights of steps; the reservoirs or bowlees, and dams, all ornamented with temples, kiosks, stairs, etc.; but our space will not permit us further to describe them. There is one very remarkable fact connected with Indian architecture, viz., that although the form of the arch is constantly used—in domes, arcades, etc., especially in the style borrowed from the Moslems—yet the radiating arch construction is never adopted. The architraves are supported on bracketed capitals, which project, bracket over bracket, till the space is spanned by one lintel. This leads to many beautiful results in the early styles, and in the later mixed style, the bracketed cornices are amongst it finest features.

INDIAN ARMY. See EAST INDIA ARMY.

INDIANA UNIVERSITY, at Bloomington, Monroe co., Ind.; unsectarian; founded in 1828. Professors in 1878, 16; students, 141. Lemuel Moss, D.D., president.

INDIAN CORN. See MAIZE.

INDIAN CRESS. See TROPÆOLUM, *ante*.

INDIAN CUCUMBER, *Medeola Virginica*, a member of the lily family growing in rich damp woods, from Canada to Florida. It is a perennial herb with a simple slender stem from 1 to 3 ft. high, covered with a flocculent, deciduous wool, and rising from a horizontal white root-stock resembling a cucumber in form, and having a similar taste. The stem bears near its middle a whorl of from 5 to 9 obovate-lanceolate, parallel-ribbed thin leaves, and another whorl of 3 (sometimes 4 or 5) leaves at the top, within which there is a sessile umbel of small, recurved flowers having 3 sepals and 3 petals, 6 stamens. Berry globose and of a dark purple, 3-celled, few-seeded. The botanical name is from Medea, the sorceress, because of supposed medicinal virtues.

INDIAN DYE. See PUCCOON.

INDIAN FIG. See PRICKLY PEAR.

INDIAN FIRE, a bright white signal-light, produced by burning a mixture of 7 parts of sulphur, 2 of realgar (q.v.), and 24 of niter.

INDIAN GRASS MATTING, or INDIAN MATTING, a kind of matting imported in large quantities from Calcutta, is made from a species of papyrus (q.v.), *P. Pangorei*, called *Madoorkati* in Bengal, and there very abundant. The stalks of the plant, when green, are split into three or four pieces, which, in drying, contract, so that the edges come almost into contact; and when woven into matting they show nearly the same beautiful shining surface on both sides.

INDIAN HEMP. See HASHISH, HEMP, INDIAN, *ante*.

INDIAN INK. The cakes of this substance, which is a mechanical mixture, and not, like the true inks, a chemical compound, are composed of lampblack and size or animal glue, with a little perfume. The lampblack must be remarkably fine, and is said to be made in China by collecting the smoke of the oil of sesame. A little camphor (about 2 per cent) is also found in the ink made in China, and is thought to improve it. This substance is used in that country with a brush both for writing and for painting upon paper of native manufacture, while, in this country, it is extensively employed for designs in black and white, and all intermediate shades of color. Much curious information on this pigment may be found in Merimée's treatise, *De la Peinture à l'Huile*.

INDIAN OCEAN, one of the five grand divisions of the universal ocean, is bounded on the s. by a line drawn from the cape of Good Hope to the most southerly extremity of Tasmania or Van Diemen's Land. Its other limits, reckoning from the last-mentioned point, are Van Diemen's Land, Australia, the Indian archipelago, Farther India, Hindustan, Persia, Arabia, and Africa. Gradually narrowing from s. to n., the Indian ocean forks at cape Comorin into the bay of Bengal on the e., and the Arabian sea on the w., the latter again branching off into two arms, the Persian gulf and the Red sea, which reach respectively the mouth of the Euphrates and the neighborhood of the Mediterranean. These details exclude the waters of the Indian archipelago, as belonging rather to the Pacific ocean. As above defined the Indian ocean stretches in lat. from 43° 35′ s. to 30° n., and in e. long. from 18° 29′ to 146° 12′. It contains thousands of islands, or rather tens of thousands. Of these Madagascar is the largest, and at about the same distance from it to the e. as the continent of Africa is to the w., lie Bourbon or Reunion towards the s., and Mauritius towards the north. Next in size to Madagascar, and, in fact, the only other island of any considerable magnitude, is Ceylon. As a channel of commerce this ocean would appear to have been the first to find a place in history, inasmuch as the earliest voyage on record beyond the land-locked Mediterranean—that of Solomon's navy—did certainly extend further than the straits of Bab-el-Mandeb. In this respect it virtually maintained its superiority during fully 2,000 years, being habitually traversed, in the line of the crow's flight, between Arabia and Hindustan, while coasting voyages alone were known in the Atlantic. This comparatively bold navigation was suggested and facilitated by the periodical monsoons of the northern part of the Indian ocean, blowing, as they do, alternately from the s.w. and the n.e.

INDIANOLA, capital of Calhoun co., Texas, a port of entry on the w. shore of Matagorda bay, 14 m. from the gulf of Mexico, and 120 m. s.w. of Galveston; pop. '70, 1900. It is the terminus of the Gulf, Western Texas, and Pacific railroad. It has a large and commodious harbor. Steamers sail regularly to Galveston, Corpus Christi, New Orleans, and New York, and the commerce is important. Cattle are the chief article of export. The town has a weekly newspaper and 2 banks. Sept. 15, 1875, the coast was visited by a severe storm of five days, when Indianola was submerged and nearly destroyed.

INDIAN POKE. See HELLEBORE, *ante*.

INDIAN RIVER, a tidal inlet of Florida, in Brevard and Volusia counties, running nearly parallel with and near the coast. Its length is 100 miles. Its width varies, the inlet in some parts expanding into large lakes or lagoons, and its depth admitting vessels drawing 5 feet. It communicates by canal with Halifax river, and continues southward to St. Lucie sound. The climate being healthful and the scenery beautiful, it is a resort for invalids.

INDIANS, AMERICAN, the collective name now generally given to the various nations and tribes inhabiting North and South America, at the time of their discovery by the Spaniards, and to such of their descendants as survive at the present day. The name of Indians was first given to the natives of America from the mistaken notion of the early voyagers, Columbus himself included, that the newly found continent was in reality a part of India. This was soon shown to be an error; but the name of Indians, thus wrongly applied to the inhabitants, continued to be used in every narrative of voyage and discovery, and has descended even to our own times, only that we now qualify it in some measure by speaking of them as *American Indians*.

In the classification of Blumenbach the American Indians are treated as a distinct variety of the human race; but in the threefold division of mankind laid down by Dr. Latham, they are ranked among the Mongolidæ. Other ethnologists also regard them as a branch of the great Mongolian family, which, at a remote period of the world's history, found its way from Asia to the American continent, and there remained for thousands of years separate from the rest of mankind, passing meanwhile through various alternations of barbarism and civilization. Morton, however, the distinguished American ethnologist, and his disciples Nott and Gliddon, claim for them a distinct origin, one as indigenous to the continent itself as its fauna and flora. Prichard, whose views generally differ from those of Morton, acknowledges that "on comparing the American tribes together, we find reasons to believe that they must have subsisted as a separate department of nations from the earliest ages of the world. Hence, in attempting to trace relations between them and the rest of mankind, we cannot expect to discover proofs of their derivation from any particular tribe or nation in the old continent. The era of their existence as a distinct and insulated race must probably be dated as far back as that time which separated into nations the inhabitants of the old world, and gave to each branch of the human family its primitive language and individuality." Dr. Robert Brown, in his *Races of Mankind*, the latest authority on the subject, attributes to the American race an Asiatic origin. He says: "Not only are the western Indians in appearance very like their nearest neighbors, the north-eastern Asiatics, but in language and tradition, it is confidently affirmed, there is a blending of the people. The Eskimo, on the American, and the Tchuktchis, on the Asiatic side, understand each other perfectly." In fact, modern anthropologists incline to think that Japan, the Kuriles, and the neighboring regions may be regarded as the original home of the greater part of the American race. It is also admitted by anthropologists that between these various tribes, from the Arctic sea to cape Horn, there is greater uniformity of physical structure and personal characteristics than is seen in any other quarter of the globe. The "red men," as they are called, of the United States and Canada, differ in many respects from the Guranis of Paraguay, and both from the wild tribes of California, but all exhibit the clearest evidence of belonging to the same great branch of the human family. Upon this point the testimony of a writer like Humboldt is very important. "The Indians of New Spain," says Humboldt, "bear a general resemblance to those who inhabit Canada, Florida, Peru, and Brazil . . . . We think we perceive them all to be descended from the same stock, notwithstanding the prodigious diversity of their languages. In the portrait drawn by Volney of the Canadian Indians, we recognize the tribe scattered over the savannahs of the Apure and the Carony. The same style of features exists in both Americas." The Mongolian cast of features is most marked in the tribes nearest the Mongol coast, i e., on the shores of the Pacific, and gets less noticeable as we go eastward. Their traditions, too, indicate that the tribes on the eastern seaboard came from the w., and the western tribes even came from regions still further west.

Generally the physical characteristics of the American Indians are as follows: a square head, with a low but broad forhead, the back of the head flattened, full face, and powerful jaws; cheek-bones prominent; lips full; eyes dark, and deeply set; the hair long, not absolutely straight, but wavy, something like a horse's mane, and like that, of a glossy hue; little or no beard—where it does appear, carefully eradicated with tweezers; color of the skin reddish or copper; height of the men about the average, but looking taller from their erect posture and slender figure; the women rather shorter, and more inclined

to obesity, but many of them with symmetrical figure and pleasing countenance; hands and feet of both men and women small.

As before said, however, there being some hundreds of tribes among the American Indians, there are many departures from these general characteristics, not only in individuals, but entire septs. "The Americans," says Prichard, "are not all of the hue denominated *red*, that is, of a copper color; some tribes are as white as many European nations; others brown or yellow; others are black, or, at least, they are described by travelers as very much resembling in color the negroes of Africa. Anatomists have distinguished what they have termed the American form of the human skull: they were led into this mistake by regarding the strongly marked characteristics of some particular tribes as univeral. The American nations are spread over a vast space, and live in different climates, and the shape of their heads is different in different parts. Nor will any epithet derived from their habits of life apply to all the tribes of this department. The native Americans are not all hunters: there are many fishing tribes among them; some are nomadic; others cultivate the earth, and live in settled habitations; and of these a part were agriculturists before the arrival of the Europeans; others have learned of their conquerors to till the soil, and have changed the ancient habits of their race, which, as we may hence infer, were not the necessary result of organization or congenital and instinctive propensity." Dr. Morton's views on this subject substantially agree with those of Prichard; and both concur in adopting the test of language as a proof of one common origin for the various native tribes of both North and South America. The linguistic conclusion, now generally acquiesced in, is thus briefly stated by Mr. Albert Gallatin: "Amidst that great diversity of American languages, considered only in reference to their vocabularies, the similarity of their structure and grammatical forms has been observed and pointed out by the American philologists. The result appears to confirm the opinions already entertained on that subject by Mr. Du Ponceau, Mr. Pickering, and others; and to prove that all the languages, not only of our own Indians, but of the native inhabitants of America, from the Arctic ocean to cape Horn, have, as far as they have been investigated, a distinct character common to all, and apparently differing from any of those of the other continents with which we are most familiar."

The next question that comes under consideration is: Whence does it arise that, with all this similarity of physical conformation and language, there should have been only two nations among so many millions—namely, the Mexicans and Peruvians—who attained to any high degree of civilization? When the Spaniards entered Mexico they found in it a rich, powerful, and warlike nation, living in walled cities, in which were palaces and other sumptuous residences. They were ruled over by an emperor or king, whose sway extended over many other nations besides his own. They worshiped the sun, and had an organized hierarchy; they had also fixed laws, were acquainted with many of the arts and sciences, especially astronomy; they practiced agriculture, worked mines, and displayed considerable skill in manufactures, both industrial and ornamental. The nation thus discovered was that of the Aztecs, who professed to have among them evidences of antiquity dating as far back as the year 554 of our era. A few years later, in Peru, the Spaniards found another nation, also exceedingly rich, numerous, and powerful, with a civilization fully as much extended as that of the Aztecs, yet differing from that in many essential particulars. This was the nation of the Quichuas, frequently termed Incas (more correctly *Yncas*), associated with whom were the Aymaras, whose country had been subjugated by the Incas two or three centuries before the arrival of Pizarro in Peru. Each of these nations—the Mexicans and Peruvians—is supposed to have slowly developed its own civilization during a long process of ages. In every other part of America European settlers and explorers have found only complete or semi-barbarism. Such was the case in Virginia; such in New England, Canada, the Hudson's bay territory, California, and Patagonia. In Central America, however, there have been found extensive remains of architecture and other traces of civilization, which would seem to date back to even a more remote period than that of the Mexican or Peruvian empires. Immense artificial mounds also exist in the valley of the Mississippi and elsewhere throughout America, supposed to be the work of the ancestors of the present wandering tribes. If so, there may be some truth in the theory of Dr. Martius, a distinguished German ethnologist, "that the nations of the new world are not in a state of primitive barbarism or living in the original simplicity of uncultivated nature, but that they are, on the contrary, the last remains of a people once high in the scale of civilization and mental improvement, now almost worn out and perishing, and sunk into the lowest stage of decline and degradation." Dr. Prichard appears inclined to the same view, adding: "Attentive observers have been struck with manifestations of greater energy and mental vigor, of more intense and deeper feeling, of a more reflective mind, of greater fortitude, and more consistent perseverance in enterprises and all pursuits, when they have compared the natives of the new world with the sensual and volatile, and almost animalized savages who are still to be found in some quarters of the old continent. They have been equally impressed by the sullen and unsocial character, by the proud apathetic endurance, by the feeble influence of social affections, by the intensity of hatred and revenge, and the deep malice-concealing dissimulation so remarkable amid the dark solitudes of the American forests."

Dr. Robert Brown adopts a geographical classification of the American tribes, which

is, on the whole, the least unsatisfactory. There are Arctic tribes; north-western tribes inhabiting the region w. of the Rocky mountains between California and Alaska; Californian tribes; Indians of the central plains; prairie tribes; north-eastern Indians; Canadian Indians; and Central American Indians. The chief existing tribes are: Eskimo, Cowichans, Tsongeisths, Nanaimos, Quakwolths, Nuchultaws, Koskeemos, Seshahts, Nittinahts in Vancouver island; Hydahs (Queen Charlotte islanders); Tsimpsheans, Bellacoolas, Chilcoatins, Shuswaps in British Columbia; Cyuse, Snakes, Klamaths in Oregon; the Digger or Californian Indians, the most degraded of all the tribes; the Comanches, Apaches, Navajos, Hualpais, Yampas in the central plains; the Moqui, Pueblos, Pimas, Papagos in New Mexico, Utahs, Pahutas, Pahides, Soshones, Loo-coorekahs, Goships, Cheyennes, Arrapahoes, Kwivas, Arickarees, Poncas, Yanktons, Gros-Ventres, and Sioux or Dakotahs, Assiniboines, Blackfeet, Crows, Omahas, Ottoes, Pawnees, etc., are all prairie tribes; the Delawares, Mo-hee-con-neughs (Mohicans), Oneidas, Tuskaroras, Senecas, Shawnees, Cherokees, Chocktaws, Creeks, Seminoles, Csages, Kaskias, Weeahs, Potowatomies, Quapaws, Peorias, Kanzans, Sauks, Foxes, Puncas, etc., in the north-eastern states; the Crees, Santeux or Ojebways, Chippewayans, the Sacliss or Shewhapmuch in Canada; Tehuantepecs, Mosquitos, Smoos, Twakas, Toonglas, Payas, Ramas, and Cookras in Central America.

The Indians are year by year decreasing in numbers. The government agents' reports are not very reliable, as they tend to over-estimate the Indian population. Dr. Robert Brown, whose classification is given above, gives some carefully prepared approximate statistics in his *Races of Mankind*. He says: "In California and the states n. of it I question if there are now over 10,000 or 12,000 Indians; while in the British possessions the number may be 30,000." A fair estimate would probably give Alaska 20,000; British Columbia, 20,000; Vancouver's island, 9,000; Canada, 5,000; California, Oregon, and states n. of it, 10,000; prairie lands w. of the Rocky mountains, 10,000; other portions of the United States, 2,000; in New Mexico and Central America, 20,000. This would give us a total of about 110,000 for the whole of North America, exclusive of half-breeds, etc. Some twenty tribes have become partially civilized, and live by agriculture, under the protection of the American government, on what are called "Indian reservations." There are in these Indian communities many men and women whom education has developed into most valuable, intelligent, and even polished members of a highly civilized community. Two tribes (Choctaws and Cherokees) have become wholly civilized, and have a settled form of government modeled on that of the United States. The Cherokees stand alone amongst modern nations in having produced a second Cadmus, one Sequoyah, or George Guess, who actually invented an alphabet. It must be stated, however, that fully one-half of these civilized tribes are, like Sequoyah, half-breeds. Even whites marrying Choctaw or Cherokee women are admitted, if they choose, into these tribes.

Again, M. d'Orbigny has classified the Indians of South America under three great groups, viz.: the Andian group, the Mediterranean group, and the Brazilio-Guarani group: and these he subdivides into thirty-nine distinct nations, viz.: "1, Quichua; 2, Aymara; 3, Chango; 4, Atacama; 5, Yuracares; 6, Mocetenes; 7, Tacana; 8, Maropa; 9, Apolista; 10, Araucananian; 11, Fuegian; 12, Patagonian; 13, Puelche; 14, Charrua; 15, Mbocobi; 16, Mataguayo; 17, Abipones; 18, Lengua; 19, Samucu; 20, Chiquito; 21, Saraveca; 22, Otuke; 23, Curuminaca; 24, Covareca; 25, Curaves; 26, Tapiis; 27, Curucaneca; 28, Paiconeca; 29, Corabeca; 30, Moxo; 31, Chapacura; 32, Itonama; 33, Canichana; 34, Movima; 35, Cayuvava; 36, Pacaguara; 37, Itenes; 38, Guarani; 39, Botocudo." Other classifications have been attempted, but all more or less arbitrary. Morton is content with two grand divisions, viz., the "Toltecan nations" and the "barbarous tribes," the former embracing the ancient Mexicans and Peruvians, and the latter all the uncivilized or semi-civilized tribes from the extreme n. to the extreme south. The Toltecans are said to be the builders of the remarkable series of mounds found throughout North America.

On this subject the reader may consult the works of Prichard, Latham, Morton, Humboldt, Du Ponceau, D'Orbigny, Gallatin, Schoolcraft, Catlin, Pickering, Prescott, Stephens, Tschudi, Fremont, and G. M. Sproat, a recent ingenious writer on western tribes. The ablest recent original authority is Dr. Robert Brown's *Races of Mankind* (vol. i.).

INDIANS, AMERICAN (*ante*). The early English and French settlers of North America were often at war with the Indians, either in self-defense or instigated by a desire for their lands. In Virginia the Indians who had combined to exterminate the whites were subdued after a ten years' war. In New England (1637) the colonists of Connecticut and Massachusetts destroyed the warlike Pequods, and in 1643 the Narragansetts. The war of Philip, king of the Wampanoags, ended, 1676, in the almost total destruction of that tribe. The Dutch in New Amsterdam and the English in North and South Carolina suffered greatly from the Indians. In the seven years' war between the English and the French the Indians were used by both sides, and terrible atrocities were committed. In 1763 a number of tribes were united under Pontiac, the chief of the Ottawas, in a general conspiracy to exterminate their conquerors, but were finally subdued. When the American revolution began the Indians, who were allies of the Eng-

lish, ravaged the frontiers. The United States, by the constitution of 1787, claiming sovereignty over the whole territory, made treaties with the Indians for the purpose of obtaining their lands; but in 1790 the Miamis and other tribes conspired and defeated the army under gen. Harmar, and the following year under gen. St. Clair, but were subdued by gen. Wayne. In 1811 they recommenced hostilities under Tecumseh, but were defeated at Tippecanoe by gen. Harrison, who also, in 1812, defeated the combined forces of the English and Indians, and killed Tecumseh. In the s. the Creeks were conquered by Jackson in 1813, and the Seminoles of Florida in 1817. In 1832 the Sacs and Foxes, under their chief Black Hawk, harassed the frontier settlements, and from time to time the Sioux, the Comanches, and Apaches, often joined by other tribes, have given the government great trouble.

In 1838 the Cherokees and Creeks were removed from Georgia to the Indian territory w. of the Mississippi, which the government had established to be the permanent home for all the Indians. The Seminoles of Florida refusing to remove, a bloody war ensued, which lasted seven years and cost $15,000,000. After the removal of the Choctaws, Creeks, and other tribes to the Indian territory, other reservations were formed in several states. In 1871 there were on reservations 237,478, which, added to 60,000 in Alaska, and about 50,000 others not yet placed in reservations, make the total number of Indians in the United States, as estimated by the Indian department, 350,000. The number in the British colonies is estimated at 150,000.

The five civilized tribes of the Indian territory had under cultivation (1879) 237,000 acres, on which they raised over 3,000,000 bush. of cereals, and were engaged largely in the raising of stock. The Indians on other reservations had under cultivation 157,056 acres, and raised over 1,500,000 bush., and all together about 225,000 tons of hay. The Indians are scattered over a large extent of country, and the difficulty of managing them is increased by the attempts of bold and unscrupulous white men to invade their reservations for trade, which often involves fraud, and for the sake of the mineral deposits known to be there. The Utes in Colorado and Apaches in New Mexico, especially, have given the government much trouble. The Utes are fierce and warlike, and resist all efforts to induce them to abandon their wandering life and cultivate the soil.

Earnest attempts have been made at different periods by individuals and societies to Christianize and civilize the Indians, some of which have been remarkably successful. The French and Spanish, in connection with their colonies, had missions among the Iroquois, Chippewas, Creeks, and other tribes. In Florida, Texas, New Mexico, and California, they had prosperous missions. In 1643 Thomas Mayhew labored with success for three years at Martha's Vineyard, Mass., followed in the same work by his father, and by others of the family for five generations. In 1646 the legislature of Massachusetts passed an act for the propagation of the gospel among the Indians, and in the same year John Eliot began his labors at Nonantum, churches were formed, and the Bible and other Christian books translated. The Brainards labored with effect in New Jersey and Pennsylvania. The Moravians and Friends have been active in instructing the Indians. The various Protestant denominations, through organized societies, have had for many years missions among the Cherokees, Choctaws, Ottawas, Chickasaws, Creeks, Dacotahs, and some other tribes, instructing them not only in religion, but also in the arts of civilized life. The Indian problem, always troublesome to the U. S. government, is now seen to involve grave moral and political issues not at first recognized. The governmental policy has been one of expediency rather than justice. Treaties have been made with the tribes as with sovereign nations, but have been set aside on easy pretexts. Indians have not been considered as citizens under the law; their ownership of property, as recognized, has been tribal and not individual. They have been allowed to be the prey of rapacious speculators in land, and thievish traders. Of late years the government has sought to apply a better policy, but the evil has been found too vast and deep for easy reform; and a wave of popular feeling is now rising, bearing in upon the government with strong demands in different directions. There are signs that the discussion will result in better processes of dealing with the Indians, and that the government will find or make its way to a system that shall be wise and just. See INDIAN TERRITORY.

INDIAN SHOT, *Canna Indica*, a plant common in almost all tropical countries; a herbaceous perennial, with a creeping root-stock (*rhizome*), and a simple stem, formed by the cohering bases of the large, tough, ovate-oblong leaves. It belongs to the natural order *marantaceæ*. It derives the name Indian shot from the seed, which is hard, round, and about the size of a very small pea, and is sometimes used as shot. The seed yields a beautiful red color. The root-stocks are very large, spongy, and jointed, and are used in Brazil for emollient poultices in tumors and abscesses. The root-stocks of some of the other species of *canna* are more valuable, yielding the starch called Tous-les-mois (q.v.).

INDIAN TERRITORIES was the name formerly given to the enormous region which for the most part is now known as the NORTH-WEST TERRITORY of Canada. The north-west territory is bounded on the e. by Manitoba and Keewatin, on the s. by the United States frontier, w. by British Columbia and Alaska, and n. by the Arctic ocean. It was organized as a territory by act of the Dominion parliament in 1875, under a governor and

council of five appointed by the Dominion government. But provision is made that when any district has a population of 1000, the inhabitants shall have power to elect a member of council; and when the population becomes sufficiently numerous, the council becomes the legislature. The capital is Battleford, on the Battle river, where government buildings have been erected. Parallel to the great chain of lakes a belt of coniferous forest, 500 m. in width, extends across the whole territory. To the n. of this is the most desolate region of the earth, the home of the musk ox and summer resort of the reindeer; but the forest extends along the Mackenzie river close to the Arctic ocean. Between the forest and the U. S. frontier lies a great region of plain and prairie—a country of gently sloping hills and large treeless expanses. Along the northern portion lies the celebrated fertile belt of the Saskatchawan, stretching 800 m. from lake Winnipeg, and from 40 to 150 m. in breadth. Along with Red river valley, this is the finest wheat-growing district in the w. of America. The region between this and the American desert is of a mixed character, much of it rich soil well suited for grazing purposes, but generally deficient in rainfall. It has been estimated that the plain and prairie region covers an area of about 200,000,000 acres, of which it is believed that 80,000,000 consist of first-class soil, another 80,000,000 of mixed agricultural and grazing lands, and 40,000,000 of lakes and marshes, with dry tracts and pastures. The Indians, still the largest portion of the inhabitants, have made over their rights in the land to the government on the same conditions as throughout what was the Hudson's bay company (q.v.) territory. Settlement has begun in the e., and is proceeding rapidly from Manitoba westward. The climate is severe in winter, the thermometer falling to — 40°, but dry and clear.

INDIAN TERRITORY, a country reserved by the government of the United States for the Indian tribes removed w. of the Mississippi, and those living there. It lies between 33° 30′ and 37° n. lat., and 94° 20′ and 103° w. long., being 370 m. long by 220 wide, with an area of 74,127 sq. miles. It is bounded on the n. by Kansas, e. by Arkansas, s. and w. by Texas, from which it is separated on the s. by the Red river. It is a beautiful country, with vast fertile plains, watered by innumerable streams, including the Red river, the Arkansas, and their branches. The climate is genial, producing cotton, tobacco, maize, wheat, and fruits. Coal, iron, zinc, copper, salt, and petroleum springs abound. Its population of about 70,000 consists of Cherokees, Creeks, Seminoles, Choctaws, Chickasaws, and remnants of smaller tribes. The principal tribes are in a high state of civilization, and, except the Seminoles, all possess a written constitution and code of laws. In 1874 there were 6 high schools, and 88 day schools among the Cherokees, Choctaws, and Chickasaws. Many of the Indians cultivate large plantations.

INDIAN TERRITORY (*ante*), the home of civilized or partially civilized remnants of once powerful aboriginal tribes, removed by the government from time to time from different parts of the union, and which, upon separate reservations and under forms of government established by themselves, are living at peace with each other and with the United States. In June, 1830, congress passed an act setting apart "all that part of the United States w. of the Mississippi, and not within the states of Missouri and Louisiana or the territory of Arkansas," to be known as the Indian country. The region thus described formed a part of the Louisiana purchase of 1803 from France. Portions thereof have since been organized into new states and territories, and only a remnant of the original Indian country now remains. To it has been added, however, a narrow adjoining strip of land w. of the 100th meridian which was ceded to the United States by Texas.

The territory contains 20 reservations, the names of which, with the extent of each in sq.m., are as follows:—Arrapahoe and Cheyenne, 6,715; Cherokee, 7,861; Chickasaw, 7,267; Choctaw, 10,450; Creek, 5,024; Kansas, 154½; Kiowa and Comanche, 4,369; Modoc, 6; Osage, 2,291; Ottawa, 28½; Pawnee, 442; Peoria, 78½; Pottawatamie, 900; Quapaw, 88½; Sac and Fox, 750; Seminole, 2124½; Senaca, 81; Shawnee, 21; Wichita, 1162; Wyandotte, 38½; total area appropriated, 47,039 sq.m.; unassigned, about 22,000 sq. miles.

White speculators and adventurers have often attempted to enter the territory and appropriate the lands not included in the reservations, but the government of the United States, in fulfillment of its treaty stipulations to the Indians, has prevented them. The latest movement of this kind was made in 1879, when the president issued his proclamation warning those engaged therein to desist, and informing them that if they should enter the territory they would be expelled, if necessary, by an armed force. A bill was lately introduced in congress to erect the Indian country into a regular territory of the United States, thus opening its unsettled lands to the whites and subjecting the Indians to the very encroachments to avoid which they consented to go upon the reservations. It has been proposed in some quarters to make the Indians citizens, to place them under territorial government, and finally admit them as a state to the union. But to this plan there are some serious obstacles, not the least of which is the unwillingness of the Indians themselves to sacrince the autonomy of their respective tribes and the governments of their own already existing. Though this may ultimately be arrived at, it is not easy to see how the government of the United States could suddenly force such a change upon them without violating the most solemn treaty obligations.

The population of the territory, exclusive of white residents, is reported to number

74,140. The number of whites legally there is about 12,000, and besides them there are 5,000 others who would be excluded if the law were strictly enforced.

Agents representing the United States live among the various tribes, exercising a paternal oversight of their affairs, and protecting them from encroachments. They are appointed by the president with the consent of the senate, and, under existing regulations of the Indian bureau, are nominated by the religious denominations which have missions among the tribes. Each tribe has its own internal government, but the United States courts have jurisdiction in civil actions where a white man is a party, in cases of crime against a white man, and of violations of the laws regulating trade and intercourse with the Indians.

It appears from the report of the commissioner of Indian affairs for 1873 that there were then in the territory 217,790 acres of cultivated land, producing in that year 1,399,952 bush. of corn; 92,574 of wheat; 60,750 of oats; 198,740 of potatoes; 5,000 of barley; 6,500 of turnips; 138,745 tons of hay; 5,000 bales of cotton; and 4,000 lbs. of sugar. Furs were sold to the value of $193,560; and 3,930,468 ft. of lumber were sawed. The number of live stock was—horses, 212,155; cattle, 322,354; sheep, 13,100; swine, 430,445; total value, $9,408,187. In 1879 the number of acres of cultivated land had increased to 237,000, producing 565,400 bush. of wheat; 2,615,000 of corn; 200,500 of oats and barley; 336,700 of vegetables; and 48,353 tons of hay.

There are more than 200 common schools and ten high schools in the territory, and in the former over 6,000 children. Nearly all the tribes have abandoned their pagan religions. The traffic in ardent spirits is absolutely prohibited, and no other territory of the United States contains so many houses of worship, or so many Sunday-schools, with so numerous an attendance, as are found in this. See INDIANS, AMERICAN.

INDIAN TOBACCO. See LOBELIA, *ante*.

INDIAN YELLOW, or PURREE, is a coloring matter highly esteemed by artists. It is exported from the East Indies in masses of 3 or 4 ozs. in weight, which are of a dark brown color externally, but of a bright orange yellow in the interior. It is generally believed to be a urinary sediment of the camel or buffalo, after the animal has fed on decayed and yellow mango leaves. Its odor is peculiar, and resembles that of castoreum. This substance consists chiefly of the magnesian salts of an acid termed *purreic* or *euxanthic acid*. It is almost insoluble in cold water or alcohol, but is soluble in hot alcohol and in ether; it also dissolves freely in boiling dilute hydrochloric acid, from which stellate groups of acicular crystals of euxanthic acid ($HO,C_{42}H_{11}O_{21}$) are deposited on cooling. Alkaline solutions dissolve this acid, and form a yellow liquid. A solution of euxanthate of potash when mixed with the solutions of the salts of the earths, gives brilliant yellow, sparingly soluble precipitates, and, with acetate of lead, it forms a yellow insoluble lake.

By dry distillation, this acid yields a yellow, crystalline sublimate of *purrenone* or *euxanthone* ($C_{40}H_{12}O_{12}$), water and carbonic acid being evolved; and, with nitric acid, it yields several nitrogenous bodies of considerable interest, in a purely chemical point of view, but of no practical importance.

INDIA RUBBER. See CAOUTCHOUC.

INDICTION, a period or cycle of 15 years, the origin of which is involved in obscurity. Connecting the original meaning of the word, viz., "the imposition of a tax," with its signification in chronology, several writers have propounded theories explanatory of its origin, none of which, however, are supported by a tittle of evidence. It began to be used in reckoning time, chiefly by ecclesiastical historians, during the life of Athanasius; it was afterwards adopted by the popes, who still continue to use it, and through whose influence it came to be so generally employed during the middle ages, that the dates of charters and public deeds of this era are expressed in indictions as well as in years of the Christian era. The time from which reckoning by indictions commenced is, according to some, Sept. 15, 312; according to the Greeks of the lower empire, Sept. 1, 312; but when this method was adopted by the popes, it was ordered to be reckoned as commencing Jan. 1, 313. The latter, which is now alone used, is called the *papal indiction*. If we reckon backwards to the commencement of the Christian era, it will be seen that 1 A.D. does not correspond to the 1st, but to the 4th year of an indiction—hence, *if to any given year of the Christian era* 3 *be added, and the sum divided by* 15, *the remainder will give the position of that year in an indiction*—e.g., 1874 A.D. is the 2d year of an indiction.

INDICTMENT is the name given to the written accusation of crime against a person, and upon which he is tried by a jury. An indictment in England commences with a caption, i.e., a description of the style of the court, which, however, is no part of the indictment; then follows the venue or statement of the place where the crime was committed; next follows the accusation, which is in the name of the jurors, i.e., the grand jury. In Scotland an indictment is also the accusation on which a prisoner is tried; but it runs in the name of the lord advocate, addressed to the prisoner. In England a prisoner is not entitled, before trial, to a copy of the indictment or a list of the witnesses against him, except in treason; but he can in most cases procure a copy of the depositions of witnesses, if these were taken before a magistrate, at a trifling expense. But

many cases are not inquired into at all before a magistrate, so that this reasonable advantage is not given uniformly in England.

In Scotland, on the other hand, a prisoner is in all cases entitled to have a copy of the indictment given to him 15 days before trial, and also a list of the witnesses to be brought against him.

INDICTMENT (*ante*). In the United States persons accused of felonies or grave misdemeanors can be brought to trial only upon an indictment which a grand jury has declared to be "a true bill." When a criminal court is convened and the grand jury has been duly constituted and instructed, the state's attorney, or some other duly qualified officer, lays before them draughts of indictment against the alleged offenders, and furnishes them with the names of the witnesses whose testimony is relied upon to support the accusation. These witnesses the grand jury examines *ex parte*, not to determine the guilt or innocence of the accused, but to ascertain whether there is or is not *prima facie* evidence of guilt sufficient to warrant their trial. If twelve or more members of the grand jury pronounce in the affirmative, the presentment, with the words "a true bill" indorsed upon the back thereof, is sent to the court; and upon the charges therein contained, carefully set forth in the indictment subsequently prepared, the accused is put upon trial before a petit jury. The indictment is prefaced by a "caption," in which are set forth the name, term, and place of meeting of the court, the names of the justices, and the fact that the grand jury was lawfully constituted. Then comes a full and particular description of the alleged crime; the name of the accused must be given if known; and if not, he must be described in such a way as to make his identity sure. The time and place of the commission of the crime must also be stated, though it is not always necessary to conviction that these particulars should be exactly supported as charged. In some cases, however, a failure upon this point is fatal to the indictment. In trials for perjury the exact day when the offense was committed must be named. To prove that the crime was committed on some other day will not avail. In cases of murder the death must be described as occurring within a year and a day of the time when the alleged fatal injury was inflicted. When several persons have been concerned in the commission of a crime, they may be indicted either jointly or separately. It is usual to describe the alleged offense in different ways, in what are usually called "counts," in order to cover any uncertainty that may exist beforehand as to the precise way in which it was committed. It is enough if the prisoner is convicted upon a single count. The indictment must charge explicitly whatever is necessary to constitute the offense. In many of the states of the American union the harsh rule of the common law, which denied the right of a person accused of treason or felony to have a copy of the indictment, has been abolished by statute.

INDIES. See EAST INDIES and WEST INDIES.

INDIGES'TION, or DYSPEPSIA, is a term somewhat vaguely applied to various forms of disease of the stomach or of the small intestines in which the natural process of digesting and assimilating the food is deranged.

The symptoms of indigestion are by no means constant in all cases. There is often *anorexia* (or want of appetite), but occasionally the appetite is excessive, and even ravenous. Nausea not unfrequently comes on soon after a meal; while in other cases there is no nausea, but after the lapse of a couple of hours the food is vomited, the vomited matters being very acid, and often bitter, from the admixture of bile. In severe cases the vomiting has been known to occur after every meal for several months. Flatulence, relieving itself in eructations, is one of the standard symptoms of this affection, the gas that gives rise to this symptom being sometimes evolved from undigested matters in the stomach, and sometimes being apparently secreted by the walls of that viscus. It is very apt to occur in dyspeptic patients if they have fasted rather longer than usual. *Cardialgia* (popularly known as *heartburn*), *pyrosis* (q.v.), or water-brash, and *gastrodynia* (commonly designated *spasm* or *cramp* of the stomach, and coming on at uncertain intervals in most severe paroxysms), are other somewhat less common symptoms of indigestion.

The treatment of indigestion is more dietetic than medicinal. The quantity of food which can be dissolved by the gastric juice and intestinal fluids being limited (see DIGESTION), care should be taken that this quantity is not exceeded; moreover, the meals should not succeed each other too rapidly. Mr. Abernethy, who was a great authority on this subject, laid great stress on the principle that the stomach should have time to perform one task before another was imposed upon it, and he always recommended his patients to allow six hours to intervene between any two meals. With regard to the nature of the food best suited to dyspeptic persons, it may be safely asserted that a mixture of well-cooked animal and vegetable food is in general more easily digested than either kind taken exclusively. Mutton, fowls, and game are the most digestible kinds of animal food; and pork and all cured meats, such as salted beef, ham, tongue, etc., should be avoided. Raw vegetables, such as salads, cucumbers, etc., must also be prohibited. In most cases dyspeptic persons would probably do well to avoid all stimulating drinks; but in some cases a little cold, weak brandy and water, or a glass of old sherry, or a little bitter ale, may be taken with advantage. But upon all points of eating and drinking a sensible patient must be mainly influenced by his own experience. The unquestionable benefit which dyspeptic patients often derive from a visit to a hydropathic estab-

lishment is due perhaps not so much to any specific action of the water, as to the well-regulated diet, the withdrawal of the mind from personal cares, and the change of scene. A six weeks' or two months' tour among the mountains of Scotland or Switzerland will in the same way often do a dyspeptic patient more good than he could have experienced from any amount of physicking at home.

A few words must be said regarding the mode of treating the most urgent of the individual symptoms. Loss of appetite may be remedied by the employment of bitters, such as quinine, gentian, chiretta, etc., or of mineral acids, or of both combined. Nausea and vomiting may be treated with hydrocyanic acid, chloroform, and creasote in very small doses. Two or three drops of dilute hydrocyanic acid in an effervescent draught are often an effectual remedy. In intense vomiting, the amount of food taken at a time must be reduced to the lowest possible limit. A tablespoonful of milk, mixed with lime-water, will sometimes remain on the stomach after all other kinds of food have been rejected. There is no better remedy for flatulence than peppermint-water; if it fails, a drop of cajeput oil on a lump of sugar may be tried. When the eructations are attended with an odor of rotten eggs—that is to say, when sulphureted hydrogen is evolved from the decomposition of matters in the stomach—an emetic is the best cure. The remedies for the pain in the stomach vary with the character of the pain; bismuth, nitrate of silver, and opium are often serviceable, but should not be taken without advice. A teaspoonful of the aromatic spirit of ammonia in a wine-glass of camphor mixture often gives instantaneous relief, and if not too often resorted to, can be taken with impunity.

INDIGIR'KA, a river of Siberia, in the government of Jakutsk, rises in the Yablonoi or Stavonoi mountains, and after a northerly course, estimated at 750 m., through a frozen desert studded with a few villages, falls into the Arctic ocean in lat. 71° n., and long. 150° east.

IN'DIGO, (Gr. *Indikon*, Indian), a most important vegetable dyestuff, yielding a beautiful blue and very durable dye, the basis also of the best black dye in woolen cloths. It has been used in India from a very early period, and was imported thence by the ancient Greeks and Romans, but was lost to Europe during great part of the middle ages—although the cultivation of the plant and preparation of the dye were described by Marco Polo in the 13th c.—until reintroduced by the Dutch about the middle of the 16th century. Its use in England, France, and Saxony was then for a considerable time prevented by a strong prejudice against it, arising from the difficulty experienced in fixing the color. Since this has been overcome the cultivation of plants producing indigo, long confined to India, has extended to many other tropical and subtropical countries, as Egypt, the West Indies, Mexico, Brazil, etc. These plants generally belong to the genus *indigofera*, of the natural order *leguminosæ*, sub-order *papilionaceæ*. The keel of the corolla is furnished on both sides with an awl-shaped spur. The species of this genus number at least 150, and are natives of almost all tropical and subtropical countries. Of these, *I. tinctoria* is the species most generally cultivated in India. It is a half-shrubby plant, 2 to 3 ft. high, with pinnate leaves, which have five or six pair of long-obovate, dull, bluish-green leaflets, and racemes of axillary pale red flowers.

The province of Tinnevelly produces a great quantity of indigo. Bengal produces, on an average, about nine millions of pounds annually. The sum which Europe annually pays for indigo is estimated at eight or ten millions of pounds sterling.

Indigo is, however, obtained from plants of other genera, particularly from *Wrightia tinctoria* (natural order *apocynaceæ*), East Indies; *baptisia tinctoria* (natural order *leguminosæ*), North America, which yields indigo of a pale color and very inferior quality; *tephrosia tinctoria* (natural order *leguminosæ*), Malabar; and *T. Apollinea*, Egypt and Nubia; *marsdenia tinctoria* (natural order *asclepiadaceæ*), in Sylhet; and *polygonum tinctorium* and *P. chinense* (natural order *polygonaceæ*), China and Japan. *Wrightia tinctoria* is a large shrub, indigenous to great part of India and to Ceylon, yielding indigo of the finest quality, and is recommended by Dr. Roxburgh for cultivation, as less dependent than the common indigo plants on rain and irrigation. It grows very freely, and throws out shoots rapidly on their being cut away.—In times when East Indian indigo was not known, or was brought to Europe only in small quantity, the same dyestuff was obtained from woad (q.v.).—A coarse kind of indigo, called bastard indigo, was also at one time made in North America from the young shoots of *amorpha cærulea*.

The Manufacture and Applications of Indigo.—The indigo plant, in its general appearance, is not unlike the lucerne of our fields. The seed is sown in drills about 10 in. apart, and soon makes its appearance above ground, when it requires incessant care to keep the weeds down, which otherwise would soon choke so tender a crop. In about three months the plants begin to flower, and are then cut down, but soon shoot up again, and yield a second cutting, sometimes a third, the same year. Formerly, indigo was carefully dried after being cut, and even fire-heat was sometimes used for the purpose, but now—at least in India—the practice is abandoned, and it is found in every respect better to use the plant whilst fresh and green. The first process is to pack a large vat full of the freshly cut indigo; heavy wooden beams are placed on the top to press it and fix it down; and water is then let into the vat, enough just to cover it. Being left in this state for from 10 to 12 hours, fermentation is set up, and much gas disengaged, the water becoming a light-green color. The green liquor is then run off into the second

vat, which is placed below the level of the first, in which, whilst the fermentation process is being repeated upon a fresh supply in the first vat, it is violently agitated by being beaten with poles: this causes the *grain*, as it is called, to separate, and the green matter suspended in the liquor becomes blue and granular. When this operation is sufficiently advanced the contents of the vat are allowed to settle, and the sediment is then run into the third vat, which is below the level of the second; from which it is pumped into a boiler. The boiler is slightly heated, and then allowed to stand for a few hours, during which time the indigo settles down, and as much clear water as possible is drawn off from above it. The boiler is then again heated, and this time up to the boiling-point; after which its contents are allowed to run on to a frame of wood, lined with "long-cloth" sheeting, where they remain to drain till about the consistence of very thick cream, when they are removed, and subjected to very heavy screw pressure; and when as hard and dry as ordinary soap, are cut by brass wire on a frame into cubes about 3 in. square; and these are laid out, so as not to touch each other, on the shelves of the drying-house. Finally the cakes are cleaned, one by one, and tightly packed in boxes for the market.

This dye is, without doubt, the oldest in use; the Greeks and Romans obtained a knowledge of its uses from India, where its employment has been very general for a great length of time. Much obscurity involves indigo and its early use, in consequence of the variation in its name; for instance, the Tamools of India call the plant *averie* and the dye itself *neelum;* in Sanskrit, the plant is *vishashodanie*, and the dye *nīlī* and *nīlinī*, whence the *anil* of the Portuguese. The Malays call the dye *taroom*, and the Arabs, *neel*.

Commercially speaking, indigo may be said to be the produce of India and Central America, as these are the only localities which supply the recognized form of the article. In India, the chief seat of the indigo manufacture, Bengal is the most important district. The total quantity received in Great Britain in 1876 was upwards of 88,000 cwts.—a vast quantity, when it is borne in mind with what difficulty it is cultivated and manufactured. When pure, indigo has a rich, dark-blue color, almost purple; it is in small cubes or parts of cubes, and its fracture shows a tendency to break up into square pieces, and indicates cracks in its substance, often filled up with a film of whitish efflorescence, probably the lime used in precipitating it. It has neither taste nor smell, and its specific gravity is about 1.50; if rubbed with any hard substance, it gives a streak with a bright coppery luster. The varieties recognized in commerce are—1st, Bengal, which, from the care taken in its preparation, and the large scale on which it is made in that district, is the best; and its various gradations of quality, ten in number, varying from 9s. to 5s. per lb., are always kept distinct. In other sorts they are usually much mixed. 2d, Madras and Kurpah; 3d, Oude; 4th, Manila; 5th, Java; and 6th, South America. The last is packed in serons or cases of dried ox-skin, and its qualities are distinguished as follows: 1st, flores; 2d, sobres, and 3d, cortes; all the others are in wooden chests, containing about 250 lbs. each.

Few materials are of greater importance to the dyer than indigo, and none require the exercise of more care and skill in using. Being insoluble in water, it requires the action of other solvents to render it capable of penetrating the fibers of the materials to be dyed. The method generally employed is the following: The indigo is broken into small lumps, and these are soaked in hot water, and left for at least 48 hours, in order that the moisture may soak through and soften them; after which they are put into the indigo-mill, which is a levigating machine, consisting of a vessel in which a roller is made to work by machinery, so as to rub down the indigo, mixed with plenty of water, to a very fine paste. This is a tedious operation; therefore, in large establishments there are usually numerous mills in the grinding-room. When sufficiently ground, the paste is removed to the dyeing-vat, where to one part of indigo is added one part of lime and three-fourths of sulphate of copper; these are well mixed with sufficient water to fill the vat, and the dyer then proceeds to dye either cotton, linen, or silk goods. See DYEING. After being dyed, the goods are dipped into a bath of diluted sulphuric or hydrochloric acid, which gives brightness and purity to the color; they are then finished by washing in a stream of pure water, and drying.

Green indigo, called *lo-kao* by the Chinese, is a substance resembling indigo, which is obtained from a tree called *hom-bi;* it is highly valued by the Chinese artists as a pigment, and also gives a beautiful permanent green color to cotton and silk cloths; it is, however, so costly, that it never can, unless differently prepared, be used as a dyeing material. The fact that the Chinese dye cotton cloths with it, is accounted for by the nature of the process of preparing the lo-kao, which is this: A well-macerated decoction of the bark of the hom-bi tree is largely diluted with water mixed with a little lime; pieces of cotton cloth are then dipped into the vat, and taken out and exposed to the sun, which changes them to a bright green; they are then placed in perfectly clean water, and agitated until the water has removed all the free coloring matter; this water is then evaporated, and the small sediment left is the lo-kao. It is the cotton cloths thus used that are sold as green-dyed goods. It is said that a similar dye stuff is obtained from another tree called *pa-bi*, and although this, as made by the natives, is much too costly to use in European dyeing, yet probably, if better means of obtaining it can be pointed out, it may become an important article of commerce.

Chemistry of Indigo.—The plants which yield indigo present no indication, when

growing, that they contain any *chromogen*, or matter capable of yielding pigment, nor is it definitely known in what form the indigo exists in the vegetable tissues.

The indigo of commerce is by no means a homogeneous body. Its essential and most important constituent is *indigotin*, or *indigo blue*, but it likewise contains *indigo brown*, *indigo red*, and other ingredients.

Indigo blue, or *indigotin* ($C_{16}H_5NO_2$), is obtained from commercial indigo by extracting the ingredients with which it is mixed by acetic acid, alkalies, and boiling alcohol. It occurs either as a dark-blue amorphous powder, or in purple, crystalline scales, with a metallic luster. It is devoid of smell and taste, and is insoluble in water, alcohol, ether, dilute acids, and alkalies. When carefully heated, it may be sublimed without decomposition. Among the products of its destructive distillation are hydrocyanate and carbonate of ammonia, aniline, etc. Indigo blue dissolves without any evolution of gas in strong sulphuric acid, forming a blue solution of *sulphindigotic acid*, which is extensively used for dyeing cloth, under the name of *Saxony blue*.

Under the action of reducing agents, such as alkaline fluids containing sulphate of iron, or a mixture of grape-sugar, alcohol, and strong soda lye, indigo blue becomes converted into *indigo white* or *reduced indigo*, which forms a yellow solution in alkaline fluids, but which, on free exposure to the air, absorbs oxygen, and is reconverted into indigo blue. Indeed, this is the best method of obtaining the latter in a state of purity from commercial indigo, of which it should form about 50 per cent.

Indigo blue occurs in small quantity in the urine of man, the horse, and the cow, and occasionally in the milk of the cow, when these fluids have been exposed for some time to the action of the air; but Schunck obtained it from the urine in so many cases (in the urine of 39 persons out of 40), that indican (or the cromogen-yielding indigo blue) must be regarded as a normal urinary constituent. See M. Schunck's paper in *The Memoirs of the Literary and Philosophical Society of Manchester*, 1857, vol. xiv., or Day's *Chemistry in its Relations to Physiology and Medicine*, 1860, pp. 310–12.

Indigo white or *reduced indigo*, in a state of purity, occurs in white flakes, which are devoid of taste or smell, are perfectly neutral, and are insoluble in water, but dissolve in alcohol, ether, and alkaline solutions. Its composition is represented by the formula $C_{16}H_6NO_2$, and as it only differs from indigo blue, $C_{16}H_5NO_2$, in containing one more equivalent of H, it may be considered as the hydride of the latter. If yarn or woven goods be immersed in an alkaline solution of this substance till they are thoroughly saturated, and are then exposed to the air, indigo blue is formed within the fibers of the tissue. The blue dye thus obtained is very intense and permanent. From its property of becoming blue on exposure to the air, indigo white is a sensitive test for the presence of free oxygen.

Many compounds of great chemical interest have been derived from indigo blue. It was from indigo that aniline (now so largely employed in the production of the pigments known as *mauve* and *magenta*) was first obtained.

INDIGO BIRD, *Cyanospiza cyanea*, a North American bird of the finch family (*fringillidæ*), a native of the United States, as far n. as the Missouri, which it visits in summer, and of Central America, where it spends the winter. It is about 5½ in. in length, of a beautiful blue color, variously tinged and shaded, the lores and angles of the chin velvet black. It frequents open places on the edges of woods, and delights to sit singing on the top of a high tree. Its song is very sweet. It is easily domesticated, and is much in request as a cage-bird.

INDIUM, a metal discovered in 1863 by spectrum analysis, in the zinc blende of Freiberg, by Richter and Reich. It is named from two indigo-colored lines in the spectrum. It has also been found in the black blende of Saxony (christophite), in the wolfram of Linnwald, and in blende of Maine. It may be prepared from crude metallic zinc, or from the deposits in galvanic batteries, by dissolving them in nitric acid and treating the filtrate with ammonia, which precipitates the oxide of indium; this is reduced to the metallic state by hydrogen or potassium cyanide. Indium has a sp. gr. of 7.421. Its atomic weight is 113.4. Its melting point is 349° F. It is not easily oxidized, even above the point of fusion. The pure metal has a bluish silvery luster somewhat like lead, which it also resembles in softness and ductility. The principal compounds have the following formula:

Chloride	$InCl_3$.
Yellow oxide	In_2O_3.
Hydroxide	InH_3O_3.
Nitrate	$In3NO_3$.
Sulphate	$In_23SO_4+9H_2O$.

INDIVIDUALITY, the quality of being individual: separate or distinct existence. There is some difference of opinion as to what constitutes individuality, the discussion being principally confined to the domain of natural history. Some authorities regard the various organisms springing by buds from a single hydroid as an individual. Others again consider various parts of a tree to be individuals. The question cannot be settled without looking at it from two points of view. In one sense all the organisms proceeding from one egg may be considered as comprising one individual, being derived from

one germ, the production of the zoöids by budding being similar to the development of a stock by grafting; but similar only because, in grafting, a part of one individual, and not a germinal part, is inserted into another, and there proceeds to grow, as though the original plant extended itself. But in the budding of hydroids the different zoöids thus produced exactly resemble each other, depart from each other, and develop independently into hydroids like their parent; and some may develop much more rapidly than others. The production of a zoöid is more like original germination or ovum development than the growth and extension of a part of the common tissues of a parent. In one sense the new tree which has grown from the stock of another is a part of that tree; but in another, and probably a more exact sense, it is another and entirely independent tree—a separate individual. A tree, taken as a whole, whether while putting out its leaves, or in bloom, or bearing ripe seed, is an individual, while each ripe seed may be regarded as potentially an individual. If it fall upon the earth and sprout it becomes an individual tree, like its parent. It might be said that the acorn does not become an individual in a strict sense until it becomes a tree; but it may be held logical to consider that it became an individual as soon as it became a perfectly developed seed. If we do not look at the subject in this way we shall be obliged to regard all objects in nature as mere fragments of one great whole, which in a spiritual sense is true; but the application of metaphysical methods to natural science only leads to confusion. Each leaf of a plant is certainly an individual leaf, but in a true sense it is not an individual, for it can have no independent existence; it is only a part of a compound organ of respiration of plant life, and may be compared to a pulmonary vesicle of the lung of an animal.

In the case of the Siamese twins, they are, doubtless, correctly regarded as two individuals, and yet in so far as their livers, which seem to have been united, were really combined and performed their functions in union, they were not quite distinct individuals. They must have possessed individual minds, and, in the higher sense, were entirely distinct individuals. Other monsters have been born having two heads and only one body. It would not be logical to regard such, taken as a whole, as being distinct individuals, each brain being dependent upon a common body. In one sense the organism comprises two individuals, but in another it does not. If such a monster could live, the two brains could not be independent in function of each other. Individuality is, therefore, to a certain degree, a relative term, and the use of the term sometimes requires explanation. This is one of those questions in which is illustrated the dependence of physical upon metaphysical science.

INDIVISIBLES, in mathematics. According to the theory of indivisibles, volumes are composed of an infinite number of planes, planes of an infinite number of lines, and lines of an infinite number of points. The point, then, is the indivisible element to which all magnitudes can be reduced—the atom of mathematics. By the method of indivisibles, as developed by geometricians of the middle ages, some of the problems to which the method of infinitesimals is now applicable were successfully solved.

INDO-CHINA (FARTHER INDIA), or the INDO-CHINESE PENINSULA. See SIAM, BURMAH, COCHIN-CHINA, *ante*.

INDO-GERMANIC LANGUAGES. See ARYAN LANGUAGES.

INDORE', a Mahratta principality of Hindustan, consists of several detached tracts, some of them lying very remote from each other. With an aggregate area of 8,075 sq.m., and an aggregate population of about 640,000, the territory, as a whole, is traversed from e. to w. by the Nerbudda, and also by the Vindhya mountains, their loftiest point within its limits being 2,500 ft. above the sea. The revenue is nearly a quarter of a million sterling; and the armed force amounts to about 20,000 men. Besides the capital, the chief towns are Rampûra, Mehadpore, Dhi, Pitlaud, Mundlaisir, Bhanpûra, and Mhow. Indore is peculiarly the country of the Bheels, one of the wildest and most savage of the aboriginal tribes of India. The country, including all between its extremes, stretches in n. lat. from 21° 18′ to 24° 46′, and in e. long. from 74° 39′ to 76° 26′. The climate is sultry, the thermometer ranging from 60° to 90° F. in the shade.

INDORE, the capital of the principality of the same name, is situated in 22° 42′ n., and long. 75° 50′ e., on the left bank of the Kuthi It stands about 2,000 ft. above the level of the sea, and is estimated to contain 15,000 inhabitants. This place, mean and insignificant enough in itself, acquired considerable notoriety in connection with the grand revolt of 1857. Though Holkar, the rajah, remained faithful to the British government, yet his troops mutinied on July 1, holding their prince as a prisoner in his own palace, and butchering many Europeans, men, women, and children, in cold blood. Indore is of modern erection, having been founded in 1767; and its original namesake, now Jemnah, still exists on the opposite bank of the river.

INDORSED, ENDORSED, or ADDORSED, terms applied in heraldry to two animals placed back to back. Two keys, two wings, etc., may also be indorsed, and a pelican is always drawn with his wings indorsed.

INDORSEMENT, the term generally used to denote the writing of the name of the holder on the back of a bill of exchange or promissory note, on transferring or assigning it to another. Signing the name "A. B." alone is a blank indorsement; and if the

transferee is named it is a special indorsement. The usual form is: "Pay C. D. or order. (Signed) A. B." In Scotland it is: "Pay the contents to C. D. or order. (Signed) A. B." When personal liability is to be avoided, the words "without recourse" are added. The word indorsement is also frequently used in English law, to denote any matters written or indorsed on the back of writs or deeds, as indorsements on declarations, on writs of summons, etc.

INDOSTAN. See INDIA, *ante*.

INDRA (from the Sanskrit *id*, which probably meant "to see, to discover," hence literally, "he who sees or discovers," scil., the doings of the world) is the name of one of those Hindu deities that were worshiped more especially in the Vedic period of the Hindu religion, but enjoyed a great legendary popularity also in the Epic and Purânic periods. See INDIA, sect. *Religion*. In that class of Rig-Veda hymns which there is reason to look upon as the oldest portion of Vedic poetry, the character of Indra is that of a mighty ruler of the bright firmament, and his principal feat is that of conquering the demon *Vritra*, a symbolical personification of the cloud which obstructs the clearness of the sky, and withholds the fructifying rain from the earth. In his battles with Vritra, he is therefore described as "opening the receptacles of the waters," as "cleaving the cloud" with his "far-whirling thunderbolt," as "casting the waters down to earth," and "restoring the sun to the sky." He is, in consequence, "the upholder of heaven, earth, and firmament," and the god "who has engendered the sun and the dawn." And since the atmospherical phenomena personified in this conception are ever and ever recurring, he is "undecaying" and "ever youthful." All the wonderful deeds of Indra, however, are performed by him merely for the benefit of the good, which in the language of the Veda means the pious men who worship him in their songs, and invigorate him with the offerings of the juice of the soma plant. See INDIA, sect. *Religion*. He is therefore the "lord of the virtuous," and the "discomfiter of those who neglect religious rites." Many other epithets, which we have not space to enumerate, illustrate the same conception. It is on account of the paramount influence which the deeds of Indra exercise on the material happiness of man, that this deity occupies a foremost rank in the Vedic worship, and that a greater number of invocations are addressed to him than to any other of the gods. But to understand the gradual expansion of his mythical character, and his ultimate degradation to an inferior position in the Hindu pantheon of a later period, it is necessary to bear in mind that, however much the Vedic poets call Indra the protector of the pious and virtuous, he is in their songs essentially a warlike god, and gradually endowed by imagination, not only with the qualities of a mighty, but also of a self-willed king. The legends which represent him in this light seem, it is true, to belong to a later class of the Rig-Veda hymns, but they show that the original conception of Indra excluded from his nature those ethical considerations which in time changed the pantheon of elementary gods into one of a different stamp. Whether the idea of an incarnation of the deity, which, at the Epic and Purânic periods, played so important a part in the history of Vishnu, did not exercise its influence as early as the composition of some of the Vedic hymns in honor of Indra, may at least be matter of doubt. He is, for instance, frequently invoked as the destroyer of cities—of seven, of ninety-nine, even of a hundred cities—and he is not only repeatedly called the slayer of the hostile tribes which surrounded the Aryan Hindus, but some of the chiefs slain by him are enumerated by name. The commentators, of course, turn those "robbers" and their "chiefs" into demons, and their cities into celestial abodes; but as it is improbable that all these names should be nothing but personifications of clouds destroyed by the thunderbolt of Indra, it is, to say the least, questionable whether events in the early history of India may not have been associated with the deeds of Indra himself, in like manner as, at the Epic period, mortal heroes were looked upon as incarnations of Vishnu, and mortal deeds transformed into exploits of this god.

The purely kingly character of Indra assumes its typical shape in the *Aitareya-Brâhmana*, where his installation as lord of the inferior gods is described with much mystical detail; and from that time he continues to be the supreme lord of the minor gods, and the type of a mortal king. During the Epic and Purânic periods, where ethical conceptions of the divine powers prevail over ideas based on elementary impressions, Indra ceases to enjoy the worship he had acquired at the Vedic time, and his existence is chiefly upheld by the poets, who, in their turn, however, work it out in the most fantastical detail. Of the eight guardians of the world, he is then the one who presides over the east, and he is still the god who sends rain and wields the thunderbolt; but poetry is more engrossed by the beauty of his paradise, *Svarga*, the happy abode of the inferior gods, and of those pious men who attain it after death in consequence of having, during life, properly discharged their religious duties; by the charms of his heavenly nymphs, the *Apsarasas*, who now and then descend to earth, to disturb the equanimity of austere penitents; by the musical performances of his choristers, the *Gandharvas;* by the splendor of his capital, *Amarâvatî;* by the fabulous beauty of his garden, *Nandana*, etc. A remarkable trait in this legendary life of Indra is the series of his conflicts with Krishna, an incarnation of Vishnu, which end, however, in his becoming reconciled with the more important god. As the god who is emphatically called the

god of the hundred sacrifices (*Satakratu*), Indra is jealous of every mortal who may have the presumption of aiming at the performance of that number of sacrifices, for the accomplishment of such an intention would raise the sacrificer to a rank equal to that which he occupies. He is therefore ever at hand to disturb sacrificial acts which may expose him to the danger of having his power shared by another Indra. According to the Purânas, the reign of this god Indra, who is frequently also called *Sakra*, or the mighty, does not last longer than the first *manwantara*, or mundane epoch. After each successive destruction of the world, a new Indra was created, together with other gods, saints, and mortal beings. Thus, the Indra of the second manwantara is *Vipaschit;* of the third, *Susânti;* of the fourth, *Sivi;* of the fifth, *Vibhu;* of the sixth, *Manojava;* and the Indra of the present age is *Purandara.* When represented in works of art, Indra is generally seen riding on his elephant; and where he is painted he is covered with eyes.

INDRÂNI', a name of the wife of the Hindu god Indra (q.v.).

INDRE, a central department of France, formed out of the western portion of the old province of Berri, lies immediately s. of the department of Loir-et-Cher. Area 2,620 sq.m., of which about four-fifths are in tillage and pasture. Pop. '76, 281,248. The department is well watered, the chief rivers being the Indre, the Creuse, and its tributary, the Anglin. The surface is for the most part flat, and the land is generally fertile, producing large crops of wheat and barley. The two principal resources of the department, however, are its vineyards and its flocks. The climate, except in the district of La Brenne, is mild and healthy. The principal manufactures are woolen and linen cloths, hosiery, scythes, paper, and porcelain. Iron mines are worked. The department is divided into four arrondissements—Châteauroux, Le Blanc, Issoudun, and La Châtre. The capital is Châteauroux.

INDRE, a river of France, rises on the northern border of the department of Creuse, flows n.w. through the departments of Indre and Indre-et-Loire, and joins the Loire 17 m. below Tours, after a course of 136 m., for the last 40 of which it is navigable.

INDRE-ET-LOIRE, an inland department of France, formed out of the ancient province of Touraine, lies n.w. of the department of Indre. Area 2,350 sq.m., of which more than one half is arable; pop. '76, 324,875. The department is watered by the Loire, the chief river, and by its tributaries, the Cher, the Indre, and the Vienne, all of them navigable. The Loire, to prevent inundations, which otherwise would be frequent and disastrous, is banked in by dikes throughout its course in this department. See LOIRE. In the s., the surface is hilly, and either waste or wooded, but in the other districts it is undulating or flat, and very fertile. Of the products, which include an abundant yield of the ordinary breadstuffs, wine, of which about 14,000,000 gallons are made in ordinary years, is one of the most important. The chief manufactures are bar-iron, powder, files, woolen cloth, silk, and leather. The department is divided into the three arrondissements of Tours, Chinon, and Loches; capital, Tours.

INDRIS. See LEMUR, *ante.*

INDU'CIÆ LEGA'LES, in Scotch law, means the number of days which a defender has to answer a summons. The term is not used in England, the phrase being "so many days to answer, to plead, etc."

INDUCT, the power of presenting to benefices, granted by the church of Rome to kings and cardinals. When the pragmatic sanction was abolished, 1516, Francis I. of France received the power of nominating to the bishoprics within his realm. The college of cardinals, by an agreement with Paul IV., 1555, have the disposal of the benefices which depend on them.

INDUCTION of clergyman, a term used in England and Ireland to denote the investing or giving possession of a benefice to a clergyman. In England and Ireland this is done by a mandate from the bishop to the archdeacon or corresponding official to make the induction. The inductor takes the clergyman by the hand, and lays it on the ring-key or latch of the church-door, then opens the door and puts him into the church, and generally the church bell is tolled, to give notice to the parishioners. In Scotland, the presbytery induct the minister.

INDUCTION, the name for one of the great processes of scientific discovery and proof. It has been seen under GENERALIZATION, that when we rise from particular facts to generalities, the result may take one of two forms—a general *notion*, or a general *proposition:* "circle" is a notion; "the circle is the line that incloses the largest space," is a proposition. The mode of arriving at such general affirmations, truths, or laws, is what is called induction. The strict meaning of the term is "the operation of *discovering* and *proving* general propositions;" while deduction, on the other hand, is the method of *applying* general propositions once discovered to particular cases, considered to be included within their scope. By induction we establish the law that heat expands bodies; by deduction we apply it to explain why a clock is slower in summer than in winter, owing to the changes of the length of the pendulum.

Induction is the only process of real inference—in other words, by it we proceed

from the known to the unknown; or from a limited range of facts, we affirm what will hold in an unlimited range. All things that we do not know by actual trial or ocular demonstration, we know by an inductive operation. Deduction is not real inference in this sense, since the general proposition already covers the case that we apply it to; in a proper deduction, the conclusion is more limited than the premises. By the inductive method, we obtain a conclusion much larger than the premises; we adventure into the sphere of the unknown, and pronounce upon what we have not yet seen. This operation necessarily implies a certain hazard; and it may be easily supposed that there are precautions requisite in working it. Nothing is more common than the making of bad inductions; and accordingly it is now considered a part of logic to lay down the rules for the right performance of this great operation.

A preliminary question arises—How can we ever be entitled to dogmatise beyond the sphere of our actual experience; to conclude, for instance, that five miles below the surface of the earth there is heat enough to make water boil? The answer to this question supplies us with what is called the *ground of induction*, which is the fact, now established by the experience of centuries, *that nature is uniform*. What has happened once, will happen again, provided the same circumstances and situation of things are exactly repeated. At a former period of the world's history, there might have been doubts on this matter, and opinions were actually held that implied a want of perfect uniformity, but now those doubts are dispelled, except, perhaps, with reference to a single question—viz., the freedom of the will (see FREE WILL). Accordingly, the problem to be solved is to ascertain what is the order of nature in the instances accessible to our observation.

The uniformity of nature is a compound of many separate uniformities. In other words, there are different departments or classes of phenomena, each determined by separate laws. Thus, we have mathematical, physical, chemical, physiological laws, the statement of which severally constitutes the subject-matter of each of these sciences. Now, a distinction is observable, which is of some importance as regards the method of inductive investigation, Some of the phenomena thus conjoined under uniform principles are properties *simultaneously* existing, as the properties of mathematical figures; others are *successions*, and affirm order in time, the most important of all which is that peculiar succession denominated cause and effect. See CAUSE. The problem of inductive inquiry is in a great measure occupied with this one department, although there are also inductions respecting contemporaneous or conjoined properties. Natural history is in part made up of affirmations of simultaneous properties, as, for example, the anatomical structure of animals, and in part of affirmations of cause and effect, as in all the operations that sustain life, and determine reproduction, growth, and death.

Respecting the whole of the phenomena implied under causation, the principle of nature's uniformity is embodied in one great and comprehensive statement, called the law of causation; the import of which is, that whatever begins to exist is uniformly preceded by something else, to which it invariably succeeds. Events do not arise of themselves, or out of nothing; and although there is such a thing as plurality of causes, everything that arises is preceded by some other thing as a cause, and always follows when that cause occurs; there being supposed no counteracting agency. The aim of the scientific inquirer, then, is to single out from the mass of circumstances that have accompanied and preceded any event, some one or more that invariably precede the occurrence of that event, which being found, are thenceforth known as its cause. This has to be accomplished by a process technically called *elimination*, by which is understood a series of operations intended to separate everything that is indifferent to the production of the phenomenon, until we arrive at some one thing or more that cannot be removed without making the effect to cease.

Mr. John Stuart Mill, in his *Logic*, has illustrated in detail the methods to be adopted for making sure that we have singled out the true causative circumstance from among the many that may precede a given effect. They resolve themselves mainly into two. "One is, by comparing together different instances in which the phenomenon occurs. The other is, by comparing instances in which the phenomenon does occur, with instances *in other respects similar* in which it does not. These two methods may be respectively denominated the method of agreement, and the method of difference."

The method of agreement supposes that we make it a study to *vary the circumstances* under which the supposed phenomenon is produced. Either by observation of cases presented in nature, or by artificially contriving new cases, in other words, by experiment, we do our utmost to obtain the effect in a great many different connections, whereby we ascertain what things are indifferent to it. Whatever circumstance can be excluded, the phenomenon still happening, or can be absent notwithstanding its presence, is not connected with it in the way of causation. The accidental or indifferent circumstances being thus eliminated, if only one remains, that is the cause; if the elimination does not go so far, but leaves three or four circumstances or agents, we can only say that the cause is among them. Mr. Mill enunciates the method of agreement in a formal canon, or rule of induction, to the following effect: *If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause (or effect) of the given phenomenon.*

If we could always obtain the requisite variety of circumstances for the exclusion of

all indifferent adjuncts, this method would fully answer the ends of inductive inquiry. But this is not always to be had, and even when practicable, the operation is often very laborious. When the other method (difference) can be applied, the desired end is reached by a shorter route. If, instead of excluding the indifferent agencies one by one, we can contrive an experiment, or make an observation, that excludes *one* agency or circumstance, followed by the cessation of the effect, we conclude at once that what has thus been left out is the cause, or an essential condition or part of the cause. Whenever we are so fortunate as to light upon two instances suited to this method, we establish causation at once and beyond all question. The *experimentum crucis* of Bacon was something of this nature; only it supposed that a question lay between two alternative or competing agencies, which an experiment had been hit upon for deciding; such an experiment behooved to be one of difference. This method is embodied in the following canon: *If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance, except one, in common, that one occurring only in the former, the circumstance in which alone the two instances differ is the effect, or cause, or a necessary part of the cause, of the phenomenon.*

These are the two leading methods, but there are certain cases met by a procedure somewhat different. Sometimes we have a phenomenon made up of causes partly known and partly unknown. It is then possible to subduct the effects due to the known causes, and what remains will be attributed to the remaining agencies. This is expressed by Mr. Mill in the following rule or canon: *Subduct from any phenomenon such part as is known by previous induction to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.* The more our knowledge is extended, the more able are we to proceed upon this method, termed the method of residues. "It is by this process, in fact," says sir John Herschel, "that science in its present advanced state is chiefly promoted."

There remains a class of laws wherein the application of any of those three methods is rendered impracticable, from the circumstance that the agency in their case is irremovable and indestructible, so that we cannot obtain any cases where it is entirely absent. Such an agent is heat, which can never be entirely separated from any body, so as to ascertain, by comparing cases of its presence with those of its absence, what effects are due to it. So we can never get out of the sphere of the earth's attraction. The difficulty hence arising is surmounted by observing the *variations of degree* of the cause, and whether there be a corresponding variation in the degree of the effect. Thus, we infer that heat is the cause of the expansion of bodies, and that its total absence would lead to their maximum condensation and consolidation, by watching the effects of any additions or subtractions of a body's temperature. Solids, liquids, and gases (with certain limited and special exceptions) are found expanding steadily as they are heated, and contracting as they are cooled; and this is to us a sufficient justification for considering that the law in question holds good. This process is termed by Mr. Mill the method of concomitant variations, and is expressed by him in the following terms: *Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause or an effect of that phenomenon, or is connected with it through some fact of causation.*

There are many problems growing out of the applications of induction to the great variety of natural phenomena, the main principles being nevertheless the same. An important extension of the means of scientific discovery and proof arises after a certain number of general laws have been discovered, and when phenomena can be shown to be results of the operation of one or more of such laws. Thus, the great induction of universal gravity was applied *deductively* to explain a great many facts besides those that enabled the induction to be made. Not merely the motions of the planets about the sun, and the satellites about the planets, but the remote and previously unexplained phenomena of the tides, the precession of the equinoxes, etc., were found to be inferences from the general principle. This mode of determining causes is called the deductive method. When several agents unite in a compound effect, there is required a process of calculation to find from the effects of the causes acting separately the combined effect due to their concurrent action, as when the path of a projectile is deduced from the laws of gravity and of projectile force. It is the deductive stage of science that enables mathematical calculation to be brought into play with such remarkable success as is seen in astronomy, mechanics, etc. See DEDUCTION.

The circumstance that phenomena may result from a concurrence of causes, leads to the distinction between ultimate laws and derivative or subordinate laws. Thus, gravity is an ultimate law; the movement of the planets in ellipses is but a subordinate law. These inferior laws may be perfectly true within their own limits, but not necessarily beyond certain limits, of time, place, and circumstance. A different adjustment of the two forces that determine a planet's motion, would cause a circular or a parabolic orbit; and therefore it is, that when phenomena result from a combination of ultimate laws acting under a certain arrangement, they are not to be generalized beyond the sphere where that arrangement holds. These inferior laws are sometimes mere inductions that have not been resolved into their constituent laws, and then they go under the name of "empirical laws." Thus, in the hands of Kepler, the elliptic orbit of the planets was only an empirical generalization, ascertained by the method of agreement;

Newton converted it into a derivative law, when he showed that it resulted from the more general laws of gravity, etc. The earlier stages of induction present us with many of those empirical laws; in some subjects—as physiology, medicine, etc.—the greater number of inductions are of this character. The cure of disease is especially an example of this: hardly any medicine can have its efficacy traced to ultimate laws of the human system. Hence the uncertainty attending the application of remedies to new cases, and also the want of success that often attends them in circumstances where we think they ought to succeed.

Induction applies to other laws than those of causation—namely, to uniformities of co-existence. For the illustration of these, as well as the other parts of induction, see Mill's *Logic*, book iv.

INDUCTION OF ELECTRIC CURRENTS. The discovery of the power of electric currents to induce currents in neighboring conducting circuits is due to Faraday. His researches on the subject, named by him *volta-electric* induction, were published in the Philosophical Transactions (1831–32). Henry (1832) observed that when contact was broken in a long galvanic circuit a bright spark occurred, which did not occur when the circuit was short. This was shown by Faraday (1834) to be due to the extra current induced by the various parts of the circuit in each other. Bachhoffner and Sturgeon (1837) showed the superior action, in induction apparatus, of a bundle of iron wires to that of a solid bar of iron. Henry (1841) studied the inductive action of induced currents of different orders. De la Rive designed, in 1843, an electro-chemical condenser, consisting of a primary coil, which, by means of the extra current, could enable a single galvanic cell to decompose water. The same decomposition, however, had been effected by Wright in 1840. Ruhmkorff constructed (1850 or 1851) the first so-called *induction coil*, the excellence of which was chiefly attained by the proper insulation of the secondary coil. Fizeau (1853) increased immensely the power of the coil, by providing it with a condenser. Of late years coils of great power have been constructed, rivaling, if not exceeding, the most powerful electric machines in length and power of spark.

The fundamental law of current induction may be thus shown: Two long copper wires are fixed so as to be parallel and close to each other. The extremities of the one are in connection with the poles of a galvanic battery, and those of the other, with the binding-screws of a galvanometer. The instant the circuit of the battery is completed, and the current sent along one wire, a current in the opposite direction is induced in the other wire, which is shown by the deflection of the needle of the galvanometer. This induced current is only momentary, for though the current continues to circulate in the first wire, the needle soon falls back to its original position of rest, and the wire then gives free passage to other currents, and appears to be in no way affected. If, now, when the needle is at rest, the battery circuit be broken, and the current stopped, another momentary current is indicated by the galvanometer needle, but in this case in the same direction as the inducing current. The inducing wire and current are called *primary*, and are so distinguished from the induced wire and current, which are termed *secondary*. The passive condition of the wire while thus under induction has been described by Faraday as electro-tonic. An electric throb, so to speak, marks the setting in of this state, and another its vanishing; the former in the opposite direction to that of the inducing current, and the latter in the same direction. If the primary wire be movable, so that it can be suddenly brought near to, and withdrawn from the secondary, while the battery current passes steadily, currents are induced as in the former case, the approach of the wire being marked by an inverse current, and its withdrawal by a direct one. As long, however, as the primary wire remains in any one position, all evidence of electricity in the secondary wire disappears; but if in this position the strength of the primary current should be increased or diminished, momentary currents in the secondary wire would again mark the changes in the primary, the increase causing an inverse, and the decrease a direct current. Hence we conclude, that *a current which begins, a current which approaches, or a current which increases in strength, induces an inverse momentary current in a neighboring conducting circuit*, and that *a current which stops, a current which retires, or a current which decreases in strength, induces a direct momentary current in a neighboring circuit.* For inverse, the word *negative*, and for direct, the word *positive*, are frequently employed in reference to induced currents.

In experiments like the above, it is much more convenient to wind the primary and secondary wires side by side round a bobbin, so as to form a coil. The wires are insulated from each other by a covering of wool or silk. Not only does such a disposition admit of very long wires being used, but it also disposes the wires employed to greater advantage, for each single turn of the primary wire acts not only on the corresponding turn of the secondary wire, but on all the turns near it. The inductive effect of such a coil is much greater than that which would be obtained by the same extent of wires running side by side in a straight or crooked line. It is not even necessary that the two wires be wound round together, each may be wound on a separate bobbin, and the one placed inside the other. The primary coil is made of wire one-twelfth of an in. in diameter, covered with wool; and the secondary coil of silk-covered wire, about one-eightieth of an in., and much longer than the primary wire. With two such coils, the illustration of the

preceding principles of induction can be conveniently given. If the primary coil be placed in the circuit of a galvanic cell, by two loose and flexible wires, so as to allow of its easy motion, and if the terminal binding-screws of the secondary coil be placed in connection with a galvanometer, when the primary coil is inserted into the secondary, a momentary inverse current is indicated, and when it is removed, a momentary direct one; or if, when the primary coil remains in the secondary, the strength of the primary current be altered, the needle announces the induction of currents according to the principles stated above. In order, however, to obtain the greatest effect from the secondary coil it is necessary, whilst the primary remains within it, to have some means of continuously completing and breaking the primary current. A contrivance for this purpose is called a *rheotom*, or *current-break*. A simple rheotom may be made of a common file, by holding one wire from the battery against the end of the file, and running the other along the teeth, the current being stopped each time the wire leaves a tooth. In this way, a rapid series of interruptions is effected, each of which is attended by an inverse and a direct current in the secondary wire. A break of the same description, but more constant, may be also made by causing a metal spring to press against the teeth of a metal wheel, both spring and wheel being connected with the battery. As the wheel is turned by a handle, the spring breaks the contact each time it slips from one tooth to another. The most convenient form of break, however, is one which is made self-acting by the action of an electro-magnet, which receives the name of a *magnetic hammer*.

Quantity and Tension of Induced Currents.—Let us place the primary coil within the secondary; let the primary, along with a self-acting rheotom, be put in the circuit of a galvanic cell, and let the secondary coil be connected with a galvanometer. The interruption in the primary current being effected by the rheotom with great rapidity, the induced inverse and direct currents are sent with corresponding rapidity through the coil of the galvanometer. If this last be of a short and thick wire, so as not to tax the tension of the current transmitted, the induced currents will not deflect the needle; or if they should happen, through the unsteady action of the break, to do so, it only oscillates round its position of rest. This proves that *the quantity of electricity transmitted by the induced inverse and direct currents is the same*, for they each exert the same influence on the needles. But if the coil of the galvanometer consist of a long fine wire, the needle is kept deviated in a direction which argues the action of the direct current. This leads us to conclude that *both currents, though equal in quantity, are unequal in tension, the direct current having the highest tension*, for it has more power to force its way through the fine wire of the galvanometer than the inverse. Other proofs of the same principles may be easily furnished.

The difference of the tension of the two induced currents is accounted for in this way: when a change takes place in the primary current, the quantity of the electricity induced by it in the secondary wire is the same whether this change takes place quickly or slowly; the tension, however, is very different. When the change takes place slowly, the total quantity of electricity in circulation continues to pass as slowly, and there is little in motion at one time; but when the same occurs quickly, it is sent with momentum, so to speak, and the quantity in circulation at one time is as much greater, in comparison with the former case, as the time is shorter. It is this quick dispatch of electricity which constitutes the tension of the current. Now, as it takes some time before the primary current is fully established, the inverse induced current is slow and of low tension; but when the contact is broken, the primary current ceases much more suddenly than it began, and the direct induced current is quick and of high tension. This view of the matter is borne out by experiment, for it is found, that *whatever favors the suddenness of the changes of the primary current, heightens the tension of the currents induced by these changes.* The break, from this circumstance, forms an important element in the construction of all induction apparatus.

The inductive power of the primary coil is immensely increased by placing a bundle of soft iron rods or wires in the center of it. The magnetism which begins and ceases in these at each passage of the current acts in conjunction with the inducing force of the coil. The center of the bobbin is hollow, to receive a bundle of this kind. The greater part of the inductive action is due to the iron core, and the induced currents got with and without it are not to be compared in point of energy. A solid bar of soft iron may also be used, but with much less advantage, for the induced currents which linger in it after the stoppage of the main current, acting themselves inductively, impair the suddenness with which the current disappears from the primary wire and magnetism from the core. The thin layer of oxide which forms on the rods insulates them sufficiently from one another, and prevents the formation of such currents. It is partly for the same reason that metal tubes cannot be used for bobbins for either primary or secondary coils. If such were used, *closed circuits* would be formed in them, the reaction of which would prolong the changes of the primary inducers, and consequently impair the tension of the secondary current. Metal bobbins would not be open to this objection if they had a longitudinal slit, which would make the tranverse section a broken ring and circuit.

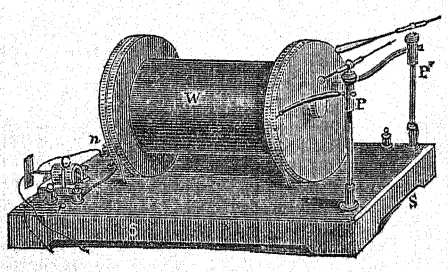
The excitation of magnetism in the core is the principal aim of the primary coil, and as a strong current is essential to that object, it is made of thick wire and of moderate length. In the secondary coil, the tension of the induced current alone is aimed at,

and with this view it is made of as thin wire as can be made, so as to admit of as many turns as possible being brought within the influence of the core and primary coil. The electric conformation of the secondary coil is sometimes looked upon in the same light as that of a galvanic battery. The total electro-motive force of the coil is the sum of that of all the turns in it, in the same way that the electro-motive force of the battery is proportionate to the number of cells.

Extra Current.—Not only does a galvanic current induce electricity in a neighboring circuit, but it also acts inductively on itself. When contact is broken in a battery circuit, the galvanic spark is seen. See GALVANISM. When the wire is short, the spark is feeble, but it increases in brilliancy with the length of the circuit, and this becomes particularly observable when the wire is wound round in a coil. This certainly does not arise from the current being strong with the long wire, and weak with the short one, for quite the reverse is the case, as might be shown with the aid of a galvanometer. The real cause of the superior brilliancy of the galvanic spark with the long circuit is to be found in the induction of the primary current on the various parts of itself, exciting, as they are called, *extra currents* in the primary wire. It has been fully attested by experiment, that at the instant *a galvanic current begins and ends, extra currents are induced by the action of the several parts of its circuit upon each other, that at the beginning of the current being inverse, and that at the end direct.* As the extra current inverse acts opposite to the main current, it does not appear as a separate current, but only retards the instantaneous passage of the main current. The extra current direct succeeds the main current, and has consequently a separate existence. It is what is generally referred to when the extra current is spoken of. This extra current is of much higher tension than the original current. The effect of the extra current on the direct induced current of the secondary coil is to lessen very decidedly its tension. If a way be made for the extra current, the tension of the induced current falls prodigiously. In a large coil-machine, which gives freely sparks of 1 or 2 in. in length, when the two portions of the break are joined by a thin wire, so as to allow the extra current to pass, sparks will not travel between the two poles, however near they are brought. When no such communication exists, a portion of the extra current leaps over between the separating parts of the break, and in so far diminishes the intensity of the secondary current. The condenser of the coil-machine, to be afterwards described, has for its object the absorption or suppression of the extra current, but the manner in which it effects this is not yet properly explained. The prejudicial effect of the extra current on the induced current is easily understood, when we bear in mind that it prolongs the cessation of the magnetism of the core and of the current in the primary coil, and thus impairing the suddenness of this change, reduces the tension of the induced current.

Induction Coil.—The essential parts of this apparatus have been already described in detail. A primary coil with its core of iron wire, and a secondary coil exterior to and insulated from a primary coil, form the main portion of the instrument. The primary coil is connected with the poles of a galvanic battery, and in the circuit a rheotom is introduced, to effect the interruptions of the current essential to its inductive action. The only parts not yet referred to are the condenser and the commutator. The condenser consists of several sheets of tinfoil and oiled silk, laid alternately the one above the other. The first, third, fifth, etc., sheets of tinfoil are connected by strips of the same material; so are the second, fourth, and sixth, etc.; the whole forming a condensing apparatus like a Leyden jar, the odd sheets forming the one coating, and the even sheets the other. Each set of sheets is connected with one of the wires of the primary coil. The condenser is generally placed in the sole of the instrument, and does not meet the eye. The commutator consists of an ivory cylinder covered with conducting plates on two sides, and is so constructed that it can break contact, or transmit the current through the coil in either direction.

An induction coil, as constructed by Ladd of London, is represented in the figure. The forms under which the instrument appears are very various, and the one in the figure only serves to show the general requirements in its construction. The two binding-screws, *p* and *n*, are for the battery wires; C is the commutator. The two coils, W, lie horizontally on the sole of the instrument, S. The secondary coil alone is seen, the primary being within it and out of view. The breaking hammer, being behind the coil, is likewise not shown. The condenser is contained by the box which constitutes the sole, and a conducting connection is established between its coatings and the wires of the primary coil. The terminations of the secondary coil are fixed to the heads of the glass pillars, P, P', which are furnished with pointed rods capable of universal motion. The excellence of the instrument depends on the proper insulation of the secondary coil. The bobbin must be made of glass, gutta-



percha, or (best of all) vulcanite, so as to prevent the induced electricity from reaching the ground by the primary coil Care must also be taken to insulate the different parts of the secondary coil from each other. If this were not done, the spark which completes the secondary current, instead of taking place at the rods, the place at which it is wanted, would pass within the coil itself. It is necessary, in consequence, to have each layer of the coil insulated from the other, by interposing gutta-percha paper, and cementing it with a hot iron to the sides of the bobbin. The induced current must thus pass through all the turns of the wire, and is prevented from shortening its course by leaping over one or more layers of the coil.

Experiments with the Induction Coil.—Say that we experiment with a coil like the one shown in the figure about 1 ft. long and nearly 6 in. in diameter, which yields readily sparks of from 4 to 5 in. with a battery of 6 Bunsen cells. After connecting the battery-wires, and setting the commutator so as to complete the contact, let us place the movable rods within an inch of each other. An uninterrupted rush of sparks is transmitted between the points of the rods. The sparks are not the clear single sparks of the electric machine, but seem to be made up of several sparks occurring at the same instant, which are white and crooked. These are enveloped in a luminous haze, which, on closer examination, wears the appearance of a congregation of the spiral sparks, the convolutions of which are in constant rotation. This hazy spark can be blown away by the breath, and separated from the white spark, which cannot be so removed. As the rods are withdrawn from each other, it disappears, and when they stand above 3 in. apart, the spark resembles in every respect the forked single spark of a powerful electric machine. When the points are withdrawn beyond striking distance, electric brushes still play between them, which become visible in a darkened room. If the hand be brought near the rod connected with the exterior end of the coil, sharp stinging sparks, 2 or 3 in. in length, are got. The rod connected with the inner end does not yield them so readily, and this is the same whether it be the positive or negative pole. When a gold-leaf electroscope is brought near, the leaves part energetically from each other; and when a spark is received by it from one of the rods, it remains permanently charged. When, however, the knob of the electroscope is brought into actual contact with either of the rods, this action ceases, because the induced currents, inverse and direct, neutralize each other. When the knob touches, both currents affect the leaves equally; but when it is at some distance, the direct current alone has tension enough to act. Each pole of the induction coil is the seat of two opposite electricities, alternating with each other, alike in quantity, but differing in tension, and this accounts for the resemblances and differences between the coil and machine electricities. When the poles are put in connection with the coatings of a Leyden jar, the sparks passing between the points are much more brilliant, and the sharp snap of the simple spark grows into a loud report. The Leyden jar effects a condensation of the electricity of each direct current, and each spark discharge takes place in shorter time, and consequently with greater intensity. The condensed spark punctures paper and the like with great facility, but it is of very low heating power. The uncondensed spark, more particularly the hazy spark, got when the poles are near each other, kindles paper, gunpowder, coal-gas, and other combustibles with readiness and certainty. It is from this property of its spark that the induction coil is of so great use in mining operations. The two ends of the wires coming from the coil are fixed near each other without touching, and are imbedded in a charge of gunpowder at a safe distance from the operator. The wires are insulated by gutta-percha, and when the induced current is sent through them, sparks pass through the gunpowder between the ends of the wires, and set fire to it. When several charges have to be ignited simultaneously, the spark of the coil-machine is considered much more reliable than the action of a powerful galvanic battery in heating thin wires connecting the ends of the battery-wires. See GALVANISM. The power of the direct induced current of even large induction coils to deflect the magnetic needle, and to effect chemical decomposition, is very insignificant. This shows that it is very much inferior to the inducing current in quantity, however much it may be superior in tension. The physiological effect, on the other hand, is tremendous, and the experimenter must take care not to allow any part of his body to form the medium of communication between the poles, as the shock so got might be dangerous, if not fatal.

When the induced current is made to pass through nearly vacuous spaces, a very splendid effect is produced The *electric egg* is employed to display this. It consists of a glass vessel in the shape of an egg, with an open neck above, and another below. Brass fittings are attached to these. The lower opening is fitted with a stop cock, and can be screwed to the plate of an air-pump. A brass rod and ball rise a short way into the egg. The fittings above are intended to allow of a rod ending in a ball passing up and down air-tight, so that the two balls can be conveniently set at different distances. When the egg is exhausted, and the wires from the coil are attached, the one above, and the other below, a luminous glow extends between the balls, which is wide in the middle, and contracts at either extremity. When the exhaustion has reached one-twelfth of an inch, as shown by the gauge of the air-pump, black bands are seen to lie horizontally in the light, so as to wear the appearance of stratification. These occur more readily when a drop or two of turpentine, alcohol, or ether have been introduced into the egg. The cause of the stratification is as yet a matter of speculation. The ball which forms the

negative pole is enveloped in a covering of blue light. The glow, which is of a beautiful mauve tint, appears to proceed from the positive ball, and reaches nearly to the negative ball, from which it is separated by a well-marked non-luminous space. By means of the commutator, these appearances at the balls can be instantly transposed. Serving the same purpose as the electric egg, there is a great variety of vacuous tubes hermetically sealed and ready for use at any time. These have been first filled with particular gases, and then exhausted, and they exhibit lights of various tints, according to the gas contained by them.

INDULGENCE, in Roman Catholic theology, means a remission, by church authority, to a repentant sinner, of the *temporal* punishment which, in the Catholic theory, remains due after the sin and its eternal punishment have been remitted. A doctrine which has been the subject of so much angry controversy, and which may be regarded as the chief among the proximate causes of the reformation, deserves very careful consideration. We must confine ourselves, however, to a brief authentic explanation of the doctrine such as it is held by Roman Catholics, together with a history of the practice in the various ages of the church.

By the discipline of the first centuries, a severe course of penitential observance was exacted of all who fell into any grievous crime, especially apostasy, murder, and adultery, such sinners being excluded from church communion for various periods, in some cases even till the hour of death. These penitential observances, which Protestants regard as purely disciplinary, were designed, according to the Catholic view, as an expiation, on the part of the penitent, for the *temporal* punishment which, after sin and the *eternal* punishment due to it have been remitted by God, still remains to be undergone; and some of the most acrimonious of the early controversies, the Montanist and the Novatian, arose as to the power of the church to relax these penitential observances, and to admit grievous sinners to communion. These ancient relaxations (of which they regard that referred to in 1 Cor. v. 5 and in 2 Cor. ii. 10 as a type) are considered by Catholics as examples of the modern indulgence; and the practice which grew up in the 3d and 4th centuries, and which even then was carried to great extremes, of granting such relaxations on the recommendation of martyrs or confessors, is held by Catholic theologians to be an illustration of that principle of vicarious atonement, according to which, in the theory of indulgences, the church is supposed to supply, from the inexhaustible treasure of the merits of Christ, and of the "supererogatory" works of the saints, what may be wanting to the completeness of the atonement of the less perfect but yet truly penitent sinner to whom she grants the indulgence. That this practice of relaxation, whatever may have been its real import, was to be used according to the judgment of the bishop as to the disposition of the penitent, is expressly laid down by the council of Ancyra in 308, and by that of Nice in 325. In all cases, however, the person granting the relaxation was to impose certain good works as a partial substitute for the penalty which had been relaxed; and among these works, which had at first been purely personal, came by degrees to be included money payments for certain religious or charitable objects, as the building of a church, or the foundation of a monastery or hospital. The name indulgence appears to have originated late, the first recorded instance of its use being by Alexander II. in the 11th c.; but the institution itself is found in full development during the wars of the crusades, the serving, or the contributing to service in which, "provided it were for devotion alone, and not from motives of greed or of glory," was accepted in the council of Clermont "as an equivalent substitute for all penance." Such an indulgence was called "plenary;" where a portion only of the penitential works was relaxed, it was called "partial;" and in order to put a bar to their excessive multiplication and to other abuses, Innocent III. declared the power of granting "plenary indulgences" to be reserved to the pope alone, bishops being only authorized to grant the "partial" or limited indulgences described above. The fourth Lateran council condemns the "indiscreet and superfluous" granting of indulgences; and among the abuses which grew up in the church during the western schism, one of the most remarkable was the lavish dispensation of indulgences, in the granting of which the contending popes rivaled each other in prodigality. The last extreme, however, was not reached until the beginning of the 16th c., when, with a view to raising the funds necessary for the erection of the great church of St. Peter's at Rome, the pope, Leo X., published a plenary indulgence, the principal condition for the gaining of which was a contribution to this work. Catholic historians contend that in itself such a condition was perfectly justifiable, and that if duly explained to the people, it might be lawfully and even meritoriously complied with; but they admit that many of the preachers of the indulgence, in extolling its natural effects, went to indefensible extremes, and that, even making the fullest allowance for exaggeration, it cannot be denied that grievous abuses both of doctrine and of practice were committed in Germany and in Switzerland. Hence the decree of the council of Trent, while it affirms that the use of indulgences, as being "most salutary for the Christian people, and approved by the authority of councils, is to be retained in the church," yet orders that, "in granting them, moderation be observed, lest, by excessive facility, discipline may be enervated." Upon the special instructions of this council all the modern legislation on the subject of indulgences has

been founded; but as the decree of the council does not explicitly declare what is the precise effect of an indulgence, it is further explained by Pope Pius VI., in his celebrated bull, *Auctorem Fidei*, that an indulgence, received with due dispositions, remits not alone the canonical penance attached to certain crimes in this life, but also the temporal punishment which would await the penitent after death to be endured by him in purgatory.

From the above explanation, it will be gathered that Catholics do not understand by an indulgence a remission of sin, much less a permission to commit sin, or a promise of forgiveness of future sin. They contend, moreover, that since the benefit of an indulgence can only be enjoyed by a sinner who has repented of sin and resolved to embrace a new life, the imputation of introducing laxity of principle and easy self-indulgence is entirely unwarranted. And although, for the most part, the good works which are required as the condition of obtaining indulgences may appear easy and even trivial, yet the one indispensable preliminary—sorrow for sin and sincere purpose of amendment—in itself involves the very highest effort of Christian virtue.

On the subject of indulgences, Protestants are accustomed to quote the language used by popes in granting them, in opposition to the views put forth by Roman Catholics in defending them. And nothing is more common than for popes in their bulls of jubilee to grant *the most plenary and complete indulgence, pardon, and remission of all sins*, on certain conditions specified. And although this grant is made only to "the faithful who are truly penitent and have confessed," yet being limited to a certain period, as the year of jubilee, and to certain conditions, as saying certain prayers, visiting certain churches, wearing or kissing a scapular, or the like, it is argued that these cannot but acquire, in the estimation of the people, an importance which is very unfavorable to penitence, virtue, faith, and piety. It is likewise urged that the whole doctrine of indulgences is founded not only on an unwarranted assumption of power given to the church, but also on a doctrine of human works and merits inconsistent with what we are taught in Scripture as to the office of Christ as a Savior.

IN DUS (Sans. *Sindhu*, probably from a root signifying "to flow"), the great river that bounds Hindustan on the west. It rises in Thibet, near the sources of the kindred Sutlej, in lat. 31° 20′ n., and long. 81° 30′ east. The precise spot is said to be 18,000 ft. above the level of the sea, and to be on the n. side of the Kailas, a Himalayan peak which overtops it by at least 4,000 feet. Its general course, till it forces its way between the Himalaya proper and the Hindu Kush, is towards the n.w., being pretty nearly at right angles to its general direction through the plains. On reaching Sussi (near the borders of Budakshan), its most northern point, it turns southward, loses itself in the hills, and reappears at Takot in Kohistan, n. of the Punjab. After a run of 870 m., having still 940 m. before it, it becomes navigable at a point which, on other grounds also, is worthy of notice. Here it receives the Cabul, its principal affluent on the right; and here is Atak (Attock), anciently Taxila, the scene of Alexander the great's passage. About half-way from Atak to its mouth, it receives, on the left, the accumulated waters of the Punjab through the single channel of the Punjnud. Each of the "five water-courses," as well as the Cabul, is practicable for inland craft to the mountains. Below its confluence with the Punjnud the Indus, instead of increasing in volume, becomes gradually less. Its basin is here narrow, so that the affluents are insignificant, while its arid sandy nature causes the river to suffer from absorption and evaporation. This operates still more powerfully from the circumstance that the river here divides into numerous channels, many of which never return at all to the main stream, while others return much shrunken in volume. This wasting of the waters is, however, not very apparent to the eye, owing to the gradual slackening of the current and the ascent of the tides. At Migani, 8 m. n. of Hyderabad, commences the Delta proper, which measures 75 m. upwards, by 130 along the coast of the Arabian sea. The area of the drainage—its extreme dimensions being respectively 900 m. and 750—has perhaps been overestimated at 488,000 sq.m., fully four times the extent of Great Britain and Ireland.

The value of the Indus as a route of traffic is less than that of most other streams of equal magnitude. In the winter, one only of its numerous outlets is at all available for communication with the sea; and even after the melting of the spring snows, there is no passage anywhere for an ordinary sea-going vessel of more than fifty tons. Still, in another respect the river is favorable for navigation, as the fall from Atak to the sea is only 1000 feet in 940 miles.

The Indus abounds with fish of excellent quality, and is infested by crocodiles. The alluvium brought down by the stream has been calculated to be sufficient for an annual formation 42 m. long, 27 m. broad, and 40 ft. deep. Near Rori, a short distance below the first point of divergence, both the main stream and one of its offsets pass through a ridge of limestone, which must at one time have turned the descending floods laterally into what is now a desert, but bearing the plainest traces of former cultivation.

INDUSIAL LIMESTONE, a singular variety of fresh-water limestone, found in Auvergne. It is formed of the cases of indusia or caddis-worms, great heaps of which have been incrusted with carbonate of lime, and formed into a hard travertine. Several beds occur, some as much as 6 ft. thick, each cubic inch of which contains as many

as ten or twelve cases. See CADDICE. The Auvergne cases are formed of the shells of a minute paludina, so small that 100 shells may be counted in a single indusium.

INDUSTRIAL ACCESSION, a phrase borrowed by the Scotch from the Roman law to denote the increased value given to a thing by labor and skill being exercised upon it. This phrase includes the case of a person building by mistake on another's land, in which case, in England, though the building was done *bonâ fide*, it belongs absolutely to the owner of the land, who is not bound even to pay for the materials, which he can keep, or their value; but in Scotland, the owner of the land, though entitled to the materials, would be liable to pay for their value.

INDUSTRIAL EXHIBITION. See EXHIBITION, INDUSTRIAL, *ante*.

INDUSTRIAL FRUITS, in Scotch law, the produce of land which the life-renter is entitled to; called in English law, emblements (q.v.).

INDUSTRIAL INSTITUTIONS. See AGRICULTURAL INSTITUTIONS; JUVENILE OFFENDERS.

INDUSTRIAL SCHOOLS. This term is used very variously, sometimes being synonymous with ragged schools, in which mechanical arts are taught; sometimes designating ordinary elementary schools, in which agricultural or some other industrial art is taught to the boys during one portion of the school-day, or in which sewing, cooking, washing, and ironing are taught to the girls. In England, Scotland, and Ireland, attempts have been made to attach practical instruction in agriculture to elementary schools for boys, but with very small success, except in the last-named country; there the Glasnevin agricultural training school has accomplished much good. See AGRICULTURAL EDUCATION. Nor can it be said that the attempt to attach other industrial arts to national and parochial schools has been attended with better results. The privy council on education gave special grants for many years to schools which combined industrial with literary instruction, but these grants are not continued in the revised code. In elementary schools for girls, industrial work, to the extent of sewing, shaping, knitting, and netting, has been almost universally introduced, and forms one of the most important and interesting features of female primary education in Great Britain; but the attempt to connect with these subjects instruction in cooking, washing, and ironing, has been tried as yet only to a limited extent, and has been only partially successful. In ragged schools, on the other hand, no department of the school-work seems to thrive better, partly because it enters so largely into the scheme of instruction, partly because the children are removed from the control of parents, and left solely to the management of the school committee; for the great obstacle in the way of connecting industrial arts with ordinary schools is the unwillingness of parents to see their children engaged in manual occupations during the time which ought, in their opinion, to be devoted solely to intellectual training and the acquisition of literary knowledge. The ragged schools to which we have just referred are recognized by the legislature as "industrial schools," to the maintenance of which the treasury may contribute on the representation of the home secretary, and may be defined as schools in which the pupils are lodged, fed, and clothed, as well as taught the elements of an ordinary education, and the practice of some trade. By a statute passed in 1866 children under 14 found begging, etc.; children under 12 charged with offenses; refractory children under 14 in charge of parent; and refractory children under 14 in workhouses or pauper schools, may be sent by a magistrate to a certified industrial school. The education acts of 1870 and 1872, for England and Scotland respectively, provide that the school-board of any parish or borough may establish and maintain industrial schools, but subject to the provisions of the industrial schools act of 1866. In 1875 the number of industrial schools in England and Scotland was 114, containing 11,776 children; in 1877 there were 124 schools, with 14,359 children.

INDUSTRIAL SOCIETIES are societies which carry on some trade, the profits of which are applied to an object of mutual benefit, resembling the object of friendly societies (q.v.). The "Industrial and Provident societies act, 1876," regulates these societies on improved principles, the first statute having been passed in 1852. Any number of persons not less than seven may establish such a society for the purpose of carrying on any labor, trade, or handicraft, whether wholesale or retail, or the buying and selling of land, or the business of banking under certain restrictions, and taking deposits only under 5s. in one payment, and under £20 from one person. The rules of the society must define the object, name, and place of office of the society, and it must in all cases be registered as one of limited liability. The rules and statute define terms of admission of members, mode of holding meetings, voting, transferability of shares, audit of accounts, investment of capital, mode of withdrawing from the society, claims of executors, application of profits, appointment and remuneration of managers and officers, and make provision for the custody, use and device, of the seal of the society. Rules must be forwarded to the registrar of friendly societies of England and Scotland, for his certificate that they are in conformity with law, before they can be acted upon. After registration a copy of the rules must be delivered to every person who demands them, on payment of one shilling. No member's interest is to exceed £200, but one society may invest its funds with another or others to any amount. The name of the society is to be

painted conspicuously on the outside of the office, and put on all bills of exchange, bills of parcels, invoices, receipts, and letters of credit, and a penalty is incurred for neglecting these requirements. These societies are placed on the same footing as friendly societies in respect of the exemption from assessment under income-tax—of settlement of disputes by registrar, justices, or county court—of compensation to members unjustly excluded—of the power of justices or the county courts in case of fraud, and of the jurisdiction of the registrar. Any member may nominate any person into whose name his interest in the society at his decease shall be transferred, but the society *may*, instead of making such transfer, pay to any nominee the full value of the shares, and *must* pay him the value of any shares, which, if transferred into his name, would increase his interest in the society to more than £200. The society may be wound up like a joint-stock company by the county court of the district, and in the event of its being wound up, past and present members are liable to contribute to the assets to an amount sufficient to pay the debts; but no past member is bound to contribute who has ceased for a year to be a member, or where the debt was contracted after he left the society, or unless the existing members are unable to satisfy the contributions necessary to pay the debts; and no member is liable to pay more than the amount, if any, unpaid on the shares in respect of which he is liable as a past or present member. Every person or member having an interest in the funds is entitled to inspect the books. A general statement of the funds of the society, showing the assets and liabilities, must be sent to the registrar once every year, and every member and depositor is entitled to demand and receive without payment a copy of such statement from the treasurer or secretary.

INEQUALITY. In algebra the relationship existing between two quantities can be expressed either by the sign of equality, as $a = b$, or by the sign of inequality, as $a > b$ and $c < d$, read respectively a is greater than b and c is less than d: the greater quantity—that which more nearly approaches to $+\infty$—is always opposite the opening of the angle. The first members are a and c; the second, b and d. When in two inequalities the greater quantity is on the same side of the sign, they subsist in the *same sense*, and when on different sides they subsist in a *contrary sense*.

INERTIA (Lat. "inactivity"), a term expressive of that indifference to a state of rest or motion which is a universal property of matter, and may be expressed by saying *that a body in motion will continue in motion, and a body at rest will remain at rest, unless acted upon by some external force.* The latter part of this principle was known to the ancients, and by them attributed to a certain repugnance to motion, which was a characteristic of all matter; but it was shown by Galileo that the former part was equally true and general. This property of matter has been called by Kepler *vis inertiæ*.

INES DE CASTRO. See CASTRO, INES DE, *ante*.

INESCUTCHEON, in heraldry, a single shield borne as a charge. When there are two or more, they are simply called escutcheons, for an inescutcheon, it is said, must always occupy the fess point of the shield. An inescutcheon is to be distinguished from an escutcheon of pretense, which is not a charge, but a separate coat.

INFALLIBILITY, in controversial theology, means the immunity from error, in all that regards faith and morals, which is claimed by the Roman Catholic church, and, at least as regards the past, by the Greek church, as represented in the decrees of the councils which that church looks upon as ecumenical. The latter claim, however, which does not go beyond that of *inerrancy*, or actual exemption from error up to the present time, differs widely from that of infallibility, as put forward by the Roman church, which involves not alone an actual historical immunity from error, but also such a positive and abiding assistance of the Spirit of God as will at all times both protect against the possibility of error, and guide and direct in the faithful teaching of all necessary truth. The infallibility claimed by the Roman church is thus of two kinds, *passive* and *active*—the first (Matt. xvi. 18), in virtue of which the church never can *receive* or *embrace* any erroneous doctrine, no matter by whom proposed; the second, in virtue of which she is charged with the function (Matt. xxviii. 19; Mark xvi. 15; Ephes. iv. 11–16) of permanently *teaching* to the world the essential truths of God, of actively resisting every access of error, and of authoritatively deciding every controversy by which the oneness of belief among the faithful may be endangered. Catholics regard this gift as a natural and necessary accompaniment of the authority in matters of faith with which they believe the church to be invested, and which, if not guided in its exercise by such infallible assistance, would be but a false light, and an attractive but dangerous instrument of delusion.

Such is the notion of infallibility as claimed by the Roman church. Two very important and practical questions, however, arise regarding it, both of which have been the occasion of much controversy even among Catholics themselves; viz., as to the *subject*, that is, the seat or the organ of this infallibility, and as to the *object*, that is, the matters to which it extends.

As to the first, all Catholics have been agreed that the body of bishops, morally speaking, throughout the church, acting in common with the pope, constitute the most perfect organ of the infallibility of the church; and hence, that when they unite in any way, whether as assembled in a general council or separated in place, their judgment is

infallible. Thus, if a doctrinal decree be addressed officially by the pope to the whole church, and be either expressly confirmed or tacitly accepted by the bishops, this decree was held to be infallible. In like manner, if a doctrinal decree, emanating even from a local council, as that of a national or even a provincial church, should be universally accepted by the pope and the bishops, that decree also was held to be infallible. In a word, wherever there is found the *united* judgment of the pope and the bishops, all agreed in accepting it as the infallible judgment of the church. But should the pope alone judge without the bishops, then arose the well-known dispute of the Gallican and ultramontane divines; the latter affirming, the former denying, the papal judgment to be infallible; but all agreeing that it was not binding *as an article of Catholic faith*, so long as it had not received the assent of the body of the bishops. By the decree of the Vatican council, 1870, this controversy has been decided; and it is now agreed that the doctrinal decrees of the pope teaching *ex cathedrâ* are to be accepted as possessing the same infallibility which attaches to the teaching of the church. See COUNCIL.

On the matters or subjects to which the gift of infallibility extends Catholics are agreed in one principle, that it embraces all those subjects, and those only, which are necessary for the maintenance of divine truth in the church. Hence, presupposing divine revelation, either written or oral, it embraces all questions of faith and morality, all subjects of general discipline, so far at least as to preclude the introduction, by authority of the church, of any discipline which should be injurious to faith or to morality. On the other hand, it does not embrace questions of science, or matters of fact, or abstract opinions unconnected with religion. On this point all Catholics have been agreed. But a very celebrated dispute arose in the 17th c., on occasion of the *Augustinus* of Jansenius, as to the infallibility of the church in judging of books, out of which originated the well-known Jansenist distinction of *law* and of *fact*. See JANSENISM. On this subject, it will be enough to say, that all Catholics are now agreed in recognizing as a necessary condition to the effective infallibility, that it should extend to the judgments upon books so far as to decide whether the doctrine contained therein may or may not be opposed to sound faith or morality.

The arguments in favor of the infallibility of the church, which Roman Catholics derive from texts of Scripture, are set aside by Protestants on the ground that these texts only teach the permanence of the church and the continuance of God's grace towards it (as Matt. xvi. 18; Matt. xxviii. 19, 20; etc.), and have no relation whatever to the special subject of infallibility.—It is common also for Protestants to urge that on the supposition of infallibility and of the need of an infallible interpreter of Scripture, as commonly declared by Roman Catholics, there can be no value in any argument from Scripture; and that the Roman Catholic theologian, in attempting to prove the infallibility of the church by Scripture, and the authority of Scripture by the infallibility of the church, is involved in the sophism of reasoning in a circle.—It is sometimes added that if God's word needs an interpreter to make it a safe rule of faith, man's word may well be supposed equally difficult to comprehend.—And the notion of infallibility, with the whole system of which it forms an essential part, is protested against as contrary to the rational nature of man, and to that personal relation and responsibility to God which are at the foundation of all true religion. Something is also made in argument of the difficulty which the advocates of the infallibility of the church have found in agreeing as to where it is lodged.

INFAMED, or DEFAMED, in heraldry, an epithet applied to a lion or other animal which has lost its tail, the loss being supposed to disgrace or defame it. *Defamed looking backwards* occurs in ancient blazon for counter-rampant regardant, the lion being supposed to be flying from an enemy.

INFAMOUS. Infamy was, in point of law, formerly a ground for rejecting a witness in a court of justice; but now, in the United Kingdom, the witness is allowed to give evidence subject to comment, and to state what he can say for what it is worth.

INFAMOUS BEHAVIOR—DISCHARGE WITH INFAMY, terms in use in the military and naval codes to designate conduct (and its penalty) which is not only opposed to discipline, but is also disgraceful in a social sense. As infamous behavior, have been always classed in all countries desertion of colors on the field of battle, failure to attempt to succor comrades in danger, cold-blooded cruelty, and other crimes which are greatly subversive of morality. If a man is found guilty of any of these crimes by a court-martial, and not sentenced to death, the sentence is ordinarily discharge—or dismissal—with ignominy or infamy. So severe an enactment adds to the force of the penalty, and stigmatizes the offender for life as a disgrace to his country and his cloth.

END OF VOLUME VII.